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ULTRA LOW VOLUME
AEROSOL GENERATOR

Model XKE

The XKD utilizes a Hatz Diesel engine. Otherwise this manual is correct.
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U.S. PAT.
3917168
Other Pats.
Pending

OPERATION
MAINTENANCE
AND
PARTS

CUSTOMER SERVICE–A TRADITION

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FOREWARD

The application of insecticides is the predominant method by which man attempts to limit the size of insect populations. Due to economic as well as environmental reasons, it is desirable to treat a given area with the least amount of insecticide that can be made to be effective. The most efficient method is to break up the liquids into aerosols and distribute these fine droplets over the affected area. The fine particles stay suspended for longer periods of time due their size and are distributed more evenly, remaining effective longer.

The term U.L.V. is an abbreviation for the terms Ultra Low Volume. Ultra Low Volume is the designation of the technique of treating areas with relatively small amounts of chemicals in the aerosol state. These chemicals are usually in a more concentrated state than chemicals used in other methods of application.

For best results, London Aire ULV Aerosol Generator should be operated and maintained in compliance with the formulation label instructions.

DESCRIPTION

This machine is intended to be vehicle or trailer mounted and is designed to be operated by the driver of the vehicle with the remote control box.

SPECIFICATIONS

TYPE:	Vehicle or trailer mountable - non-thermal, U.L.V. (Ultra Low Volume) Cold fog aerosol generator.
ENGINE:	Kohler Magnum cast iron, one cylinder, 4-cycle, gasoline, 8 h.p., 12 v. Fuel Consumption - regular or no lead automotive - 0.7 gal/hr. (2.65 liter/hr) electric start with alternator.
AIR PUMP:	Positive displacement, 4 cylinder, all cast iron, belt driven, 900 r.p.m.
FORMULATION PUMP:	Positive displacement piston pump with adjustable output from: 0 to 10 oz./min. (0 to 295.7 ml/min.)
NOZZLE SYSTEM:	360^{o} horizontal adjustment (azimuth) and 30^{o}-60^{o} vertical adjustment (elevation).
TANKS:	All tanks corrosion-resistant, high density polyethylene, (formulation and flushing tanks only). Formulation: 15 U.S. Gallons (56.7 Liters) Flushing: 1.5 U.S. Gallons (5.67 Liters) (Optional) Gasoline: 3.0 U.S. Gallons (11.3 Liters)
PARTICLE SIZE:	5 to 20 Microns MMD (mass median diameter) depending on flow rate and viscosity.
WEIGHT EMPTY:	280 pounds (127 kilograms)
LENGTH:	42 inches (106 cm)
WIDTH:	34 inches (86 cm)
HEIGHT:	30 inches (76 cm)

I. SAFETY PRECAUTIONS

WARNING

READ AND UNDERSTAND THESE SAFETY PRECAUTIONS BEFORE OPERATING MACHINE.

1. ENGINE AND FUEL: This machine uses gasoline as the fuel for the internal combustion engine and all precautions commonly applying to this volatile fuel should be observed. Exercise extreme caution to avoid spilling of gasoline. If spillage occurs, wipe it off and allow evaporation time before starting the engine. DO NOT attempt to put fuel in the tank while the machine is still running. Avoid smoking or open flame in area when handling gasoline. Never run the unit indoors unless exhaust is vented to outside. These fumes contain carbon monoxide which is colorless and odorless and can be fatal.

NOTE

DO NOT OPERATE ENGINE WITHOUT MUFFLER.

DO NOT TOUCH HOT MUFFLER, CYLINDERS OR FINS AS CONTACT MAY CAUSE BURNS.

Except for adjustment, DO NOT OPERATE THE ENGINE IF AIR CLEANER OR COVER DIRECTLY OVER THE CARBUETOR AIR INTAKE IS REMOVED.

DO NOT RUN THE UNIT IF THE BELT GUARD IS REMOVED.

DO NOT TAMPER WITH GOVERNOR SPRINGS, GOVERNOR LINKS OR OTHER PARTS WHICH MAY INCREASE OR DECREASE THE GOVERNED ENGINE SPEED.

2. The ENGINE SPEED (RPM) should be check periodically to ensure that it is operating correctly, as the engine affects the air pressure and formulation flow which affects droplet size. The correct engine speed should be 2700 r.p.m. plus or minus 150 r.p.m.

3. MACHINE DAMAGE: Never operate a machine after it has been damaged. A damaged machine can be very hazardous.

4. WIND: Spraying during windy conditions is not usually practical because the formulation will drift out of the intended area. However, under NO circumstances should spraying into the wind be attempted. This may cause hazardous accumulations of formulation on the machine or carrying vehicle.

SAFETY PRECAUTIONS

(continued)

5. SAFETY EQUIPMENT: In addition to any safety equipment that may be required by the type of formulation which is being used, the following items should be with each vehicle which carries this machine during fogging operations:

    a. Fire Extinguisher, chemical type rated for fuel fires.
    b. First Aid Kit.
    c. Eye Wash Solution.
    d. Safety Glasses
    e. Container of Oil Dry Compound.
    f. Gloves rated for high temperature.
    g. Respirator adequate for formulation being used.

6. CHILDREN: Many spraying operations are performed in residential areas commonly at dusk. This presents the operator with the problem of children who are attracted to the noise and/or the mist being created. The possible hazard lies in the toxic effect of some formulations, the severity of which depends upon the chemical used, mist density, and the length of time of direct exposure. IT IS THE OPERATOR'S RESPONSIBILITY TO DISCOURAGE ANYONE FROM PLAYING IN THE MIST OR BEING NEAR THE MOVING VEHICLE.

7. FORMULATIONS: Ensure that formulations are applied only in strict compliance with the formulation label as well as local, state, and federal regulations and that these formulations are dispersed only by trained personnel of public health organizations, mosquito abatement districts, pest control operators or other qualified personnel.

    a. Always comply with any requirements for protective clothing, goggles, gloves, facial masks, or respirators required on the formulation label.
    b. Do not exceed the dosage set forth on the registration label of the insecticide to be used.
    c. Always store formulation in its original labeled container.

IN NO WAY IS IT TO BE CONSTRUED THAT THE CHEMICALS AND/OR DOSAGES ARE THE RECOMMENDATION OF LONDON FOG, INC.

LONDON FOG, INC. SHALL IN NO EVENT BE LIABLE FOR CONSEQUENTIAL DAMAGES OR CONTINGENT LIABILITIES ARISING OUT OF THE FAILURE OF ANY AEROSOL GENERATOR OR PART TO OPERATE PROPERLY.

II. ASSEMBLY/INSTALLATION INSTRUCTIONS

1. Uncrate the unit and remove all packing materials.

   NOTE

   It is a good idea to retain the original machine shipping carton as well as its inner packing and blocking materials for any future storage and/or shipment which may be required.

2. Place the Remote Control Unit where it will not be damaged while machine is being prepared.

3. Lift the machine onto the vehicle with the discharge end of the machine toward the rear of the vehicle.

4. Pass the Remote Control Unit through an open window and locate within reach of the person who will be operating the machine. If permanent vehicle installation is desired, the remote control cable can be passed through a small hole in the vehicle cab and then reconnected. Make sure the small hole provides proper protection against wiring damage and is re-sealed to prevent exhaust gases from entering inside of the vehicle.

5. Using the most convenient routing, run the control harness to the connecting support bracket located on the engine gas tank bracket. Orient the electrical plug on the harness so that the electrical pin locations match the mating pin receptacles in the socket and push the plug firmly into the socket.

   Push the air line connector into the mating quick connect socket and lock into place.

6. Securely bolt the machine to the vehicle.

7. Correct battery type is Group U1 garden tractor. Use NAPA 8221, Sears 9603 or any equivalent measuring 7 3/4 x 5 1/4 x 7 1/4 high.

WARNING

DANGER POISON

BATTERIES PRODUCE EXPLOSIVE GASES. KEEP SPARKS, FLAME, CIGARETTES, AWAY. VENTILATE WHEN CHARGING OR USING IN AN ENCLOSED SPACE.

BATTERIES CONTAIN SULFURIC ACID WHICH CAUSES SEVERE BURNS. IF ACID CONTACTS EYES, SKIN, OR CLOTHING, FLUSH WELL WITH WATER. FOR CONTACT WITH EYES, GET IMMEDIATE MEDICAL ATTENTION.

KEEP BATTERY AND ACID AWAY FROM CHILDREN AND OTHER PERSONS WHO MAY NOT BE AWARE OF DANGERS INVOLVED.

ASSEMBLY/INSTALLATION INSTRUCTIONS

(continued)

A. Remove battery from its mounting and place on a stable workbench.

B. Remove vent caps from battery. Remove or destroy any sealing device which may have been used to close or restrict the vent opening in the caps.

C. Fill each cell of the battery to the top of the separators with approved battery electrolyte of 1.265 specific gravity.

NOTE

Temperature of battery and electrolyte at the time of filling should be above 60 degrees F. (15 degrees C.)

CAUTION

Never fill battery in machine as spills will damage finish on frame and cause premature corrosion.

D. Charge 12 volt battery at 30-40 amps until the acid temperature is above 80 degrees F. (26 degrees C.) and the hydrometer reading is 1.250 or higher.

NOTE

Both temperature and hydrometer reading requirements must be met.

E. After charging the battery, check acid levels in all cells and fill each cell with acid to the proper level.

F. Re-install vented caps.

G. Re-install the battery onto machine.

H. Connect Positive (+) cable (leading from the starter switch which is located on the engine switch panel) to the positive (+) post on the battery and tighten bolt.

I. Connect the Negative (-) cable to the Negative (-) post on the battery and tighten bolt.

ASSEMBLY/INSTALLATION INSTRUCTIONS

(continued)

CAUTION

a. When installing battery, connect the negative (-) cable last to prevent sparking and shorting.

b. When disconnecting is required, remove negative (-) connection first.

c. Reversed polarity can cause damage to the starting and charging systems.

NOTE

After battery has been initially serviced, only water should be added to restore the liquid level in each cell. Further addition of acid will cause battery failure.

8. Loosen the ball swival joint and orient the nozzle as required by the formulation label. Usual set-up is towards the rear and 45° up. Retighten ball joint.

III. SERVICE BEFORE START-UP:

1. Engine: Service engine with gasoline and oil as per the accompanying Engine Operating and Maintenance Instructions. (Engine may already be serviced with oil.)

2. Air Pump: Before starting the machine, remove the dipstick and check oil level. Fill as necessary with SAE 30 non-detergent type oil for the first 50 hours of operation. Oil level should never be higher than the upper mark on the dipstick, nor lower than the lower mark.

   After the 50 hour break in period, the compressor oil should be changed to a synthetic oil such as Anderol 500 or Amsoil Synthetic Reciprocating Compressor oil available locally or from London Fog Inc. (part number 2319, pint or part number 2320, quart)

   NOTE

   The synthetic type oil is recommended due to the lower maintenance requirements for the air pump and other components. DO NOT mix oils.

3. Drive belts: Check drive belts which should be in perfect alignment and tight.

IV. PRE-START CHECKLIST

1. Verify that the remote control box is within easy reach of the operator.

2. Verify that the nozzle is in the correct position as required for the spraying operation to be accomplished, and that the ball joint which allows this positioning is tight.

3. Verify that the engine has sufficient fuel and is properly lubricated.

4. Verify that the air pump has been serviced.

5. Inspect all hoses for abnormal conditions.

6. Verify that no foreign objects or tools have been left in or about the machine.

7. Verify that sufficient amount of formulation is in the tank and that the tank filling plug is tight, and that the air vent hole (located on the underside of the tank handle) is not obstructed.

8. Verify that the battery is mounted securely and cable connections are proper and tight.

9. Verify that all safety equipment is in place and is in proper working order.

CAUTION

Before proceeding with any spraying operation, the operator should be thoroughly familiar with starting and stopping the machine and with all the operating controls. If you are operating the machine for the first time, exercise the machine through its full operational sequences from a position of full visibility of the machine before operating the machine fully remote. This is also a good idea for experienced operators who may be operating a new machine or who may be reactivating a machine after repairs or a period of inactivity. Refer to the operation section for starting and stopping instructions.

V. START UP

NOTE

On machines equipped with remote start, the engine may be started from either the engine or the remote control box. When cold, choking may be required on the initial start-up.

1. Verify that the spray On-Off switch on the remote control box is in the OFF position.

2. Place the Ignition On-Off switch on the remote control box into the ON position and the ignition key on engine to the "ON" position.

3. The engine may now be started from either the remote control box with the START switch or from the engine by turning the key to the start position.

NOTE

The best starter life is provided by using short cranking cycles of several seconds: prolonged cranking can damage the starter motor if cranked more than 15 seconds per minute.

CAUTION

On each start up, be sure the formulation pump does not run dry. If there is no formulation in the lines, immediately turn on the spray nozzle so that formulation is drawn through the system. The spray may be turned off as soon as formulation reaches the nozzle.

VI. OPERATION

Read this complete OPERATION section and the section on SAFETY PRECAUTIONS before starting the machine.

For first time operation the sections on INSTALLATION, SERVICE BEFORE STARTUP, and PRESTART CHECKLIST must be performed before proceeding with operation.

When operating this machine for the first time, move to an uncongested and well ventilated work area in an open area away from flammable materials.

WARNING

READ THE SECTION ON SAFETY PRECAUTIONS BEFORE PREPARING TO DISPENSE FORMULATION.

READ AND THOROUGHLY UNDERSTAND ALL INFORMATION, CAUTIONS AND WARNINGS ON THE FORMULATION LABEL WHICH MAY AFFECT PERSONAL SAFETY. KNOW ANY DANGERS OF THE SOLUTION USED AND KNOW WHAT TO DO IN CASE OF AN ACCIDENT INVOLVING THE SOLUTION.

ALWAYS USE THE APPROPRIATE SAFETY EQUIPMENT AND DRESS ACCORDING TO THE CHEMICAL FORMULATION WHICH IS BEING USED.

DO NOT USE ANY SUBSTANCES FROM UNMARKED CONTAINERS OR FROM CONTAINERS WITH OBVIOUSLY ALTERED LABELS.

READ AND FOLLOW THE INSTRUCTIONS ON THE CHEMICAL SOLUTION LABEL FOR ULV SPRAYING OF THE SOLUTION.

DO NOT SPRAY NEAR AN OPEN FLAME OR HOT MATERIALS.

DO NOT LEAVE THE MACHINE UNATTENDED.

1. CALIBRATION: SETTING THE FLOW RATE

CAUTION

Before calibration, be sure the machine fluid lines are free from any air bubbles. On initial start-up, it may be helpful to temporarily move the pump pointer to a high scale reading to get the system primed and the lines purged of any air bubbles.

2. SPRAYING

CAUTION

Before dispensing insecticide, be certain that no one is present in the area of the nozzle or aerosol dispersion area.

A. To dispense insecticide with the ULV machine running, move the flow control on/off nozzle switch (cab control) to the ON position. The green indicator light should come on.

B. The air pressure gauge on the cab control panel should read between 75 and 85 pound per square inch pressure. If this pressure is not present, shut off the flow control switch and see Air Pressure Instructions. DO NOT dispense insecticide until the air pressure problem is corrected.

The fluid pump system is calibrated to the graduated scale on the pump at the London Fog factory. If any major deviation in the flow rate occurs, first check the other components in the system (such as strainers, fittings, etc.). Check for air bubbles in the suction side of the lines as well as the pressure side. Check for fluid leaks in the pressure side of the lines.

Minor deviations not created by equipment malfunctions, should they occur, may be recalibrated by measuring the flow and adjusting the pump metering pointer until the desired flow is obtained.

To measure the flow, disconnect the fluid line from the aerosol nozzle. Place the disconnected line into an empty container.

Start the pump. With the cab panel flow control switch turned on, fluid will be pumped through the disconnected line into the container. Move the disconnected line from the container to a measuring beaker for a measured amount of time -- preferably using a stop watch.

Compare the measured amount to the flow desired or to the pump scale. Adjust or lock the pump pointer as may be required.

Be sure to replace all lines and fittings after calibrating.

The following are rough estimates of flow rates using very light mineral oil. Always calibrate to establish correct flow rates for the chemical or insecticide to be used.

Flow Rate (ml/minute)	Flow Rate (oz./minute)	Scale Setting
95	3	.50
150	5	1.00
250	8.40	1.50
320	10	2.00
410	14.20	2.50
475	16	3.00

FINISHED OPERATION:

When the spraying operation is complete, the unit must be flushed in accordance with "FLUSHING SYSTEM" section of this manual.

4. FLUSHING

A. Before Storage:

When flushing for storage, drain the formulation tank and place flushing fluid in the main formulation tank. Run the generator with the nozzle solenoid valve in both the ON and OFF positions to clean all lines. Drain any remaining flushing solution from formulation tank. Repeat as necessary.

B. After each use (without Built-In Flusher accessory):

1. With the aerosol generator running, turn ON the spray nozzle.

2. At the formulation filter (large white nylon assembly), disconnect the larger (3/8") fluid line which runs from the filter to the Posi-Drive pump. Place this line in a container of flushing solution. Run the unit until the flushing fluid has cleaned the lines, pump and nozzle.

NOTE

More rapid flushing may be accomplished by moving the pump pointer to a high flow rate setting.

CAUTION

When flushing the generator, the spray switch MUST be turned ON (at the cab control) so that the machine is discharging aerosol.

3. Reconnect the fluid line to the formulation filter. Tighten very finger tight. Do not use wrenches.

C. After each use (with Built-In Flusher):

Use same method as B above except in step #2, just turn the flush valve to the FLUSH position. Eliminate step #3 above.

VII. SERVICE SCHEDULE

ITEM TO BE SERVICED	Interval (Hours) Daily	25	50	100	500
Nozzle Air Pressure	X				
Calibration	X				
Check Air Pump Oil	X				
Check Air Pump Belts	X				
Check Engine Oil	X				
Clean Nozzle			X		
Flush	X				
Change Air Pump Oil				X	
Change Engine Oil		X			
Clean Formulation Filter				X	
Clean Air Pump Air Filters				X	
Replace Engine Air Cleaner Element			X		
Check Battery				X	
Check/Gap Spark Plug				X	
Decarbonize Engine					X
Service Breaker Points					X
Clean Engine Cooling Fins			X		
Check/Set Engine Timing					X
Check Valve Clearances					X
Check All Fittings	X				
Check Posi-Drive Pump Belt			X		
Check Engine Flywheel screen	X				
Check Engine Crankcase Breather					X
Check/Set Governor					X
Drain Airpump Pulsation Chamber		X			
Check Pulsation Damper			X		
Over-Pressure Cut-Off Switch					A/R

VIII. MAINTENANCE

1. AIR PRESSURES

A. Low Air Pressure:

1. Air pressure to air tip 75-85 psi, as measured by air pressure gauge on remote control panel.

2. Engine should run at 2700 rpm and air pump at 925 rpm. A loose or slipping belt can cause loss of air pump rpm. Malfunctioning engine or governor out of adjustment can cause improper engine rpm.

3. Air leaks can cause reduced pressure even though engine and air pump are operating OK. Air leak at or around air-fluid nozzle tip or junction of nozzle with the nozzle body, can cause reduced pressure. Be sure that teflon gasket (part no. 1013) which seals the mating surfaces between the air-fluid nozzle and nozzle body is in good condition and properly installed. Be sure that air fluid nozzle is properly tensioned against the teflon gasket. Air leaks at any of the air line joints can also cause reduced pressure.

   Low pressure as indicated at remote control panel can cause poor atomization resulting in too large fluid droplets.

NOTE

If nozzle air pressure is below normal on Daily Check-UP, check for air leaks at all joints. Air leaks can be detected by holding the hand or fingers close to the various joints and feeling if air under pressure is blown against the hand or fingers. Low nozzle air pressure may also be cuased by failure to close the pulsation chamber drain valve after use for draining.

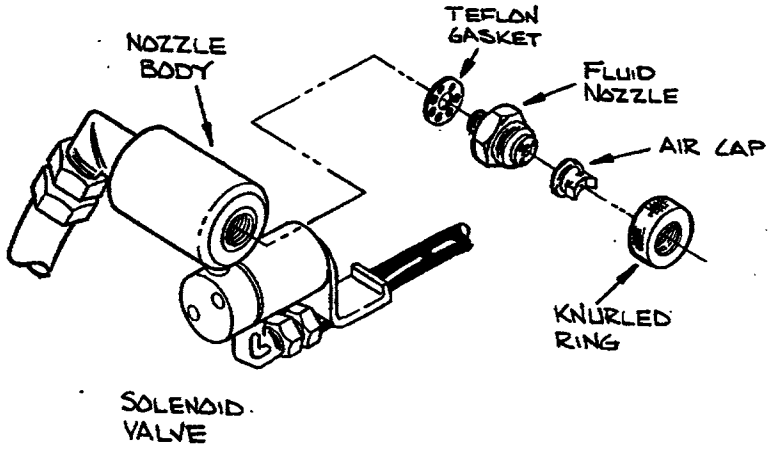
B. High Air Pressure:

If air pressure exceeds normal setting and the engine rpm has not increased above normal, a partial blockage may have occured in the air cap of the aerosol nozzle assembly. To clean air cap (and fluid nozzle when necessary) use acetone as a solvent for gum or varnish and wipe all surfaces clean with a rag. Carefully clean the orifices in the air cap with toothpicks and acetone. Blow through these orifices with compressed air if available. While air cap is removed, wipe clean all exposed surfaces of the fluid nozzle.

MAINTENANCE

(continued)

Be sure that any deposit or build-up is wiped clean from the projecting snout of the fluid nozzle, where it projects through the center orifice of the air cap.



While air cap is removed, also inspect the three holes in the fluid nozzle for deposits or internal build-up. Cleaning of these holes (and removal of the fluid nozzle) is seldom required due to the large area in relation to the air flow area through the air cap. To clean the holes in the fluid nozzle, remove nozzle and clean the three holes with a toothpick and acetone. Also clean all exposed surfaces with a rag and acetone. At the same time, clean the circular air groove in the back of the fluid nozzle. Blow through the three holes with compressed air, if available.

All nozzle assembly parts should be soaked in acetone if necessary to soften gum, varnish or other desposits.

Use care not to over-tighten the fluid nozzle against its teflon gasket so as to avoid extruding or damaging this gasket. Replace teflon gasket if worn or damaged in any way.

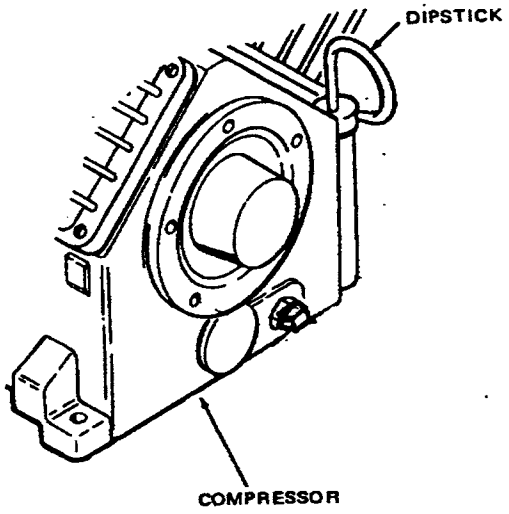
Unduly high pressures can be caused by air pump turning in excess of 900 rpm, which is unlikely.

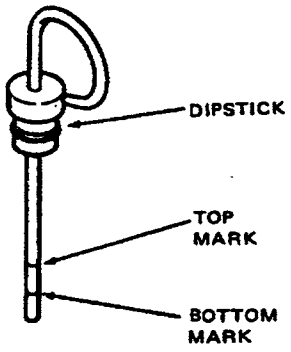
2. AIR PUMP

Check oil level daily. Oil level must never be higher than the upper mark on dip rod nor lower than lower mark. Use Amsoil Synthetic Reciprocating Compressor Oil, Anderol 500 Synthetic Reciprocating Compressor Lubricant or SAE 30 non-detergent petroleum based oil.

NOTE

The synthetic type oil is recommended due to the lower maintenance requirements for the air pump and other components.





MAINTENANCE

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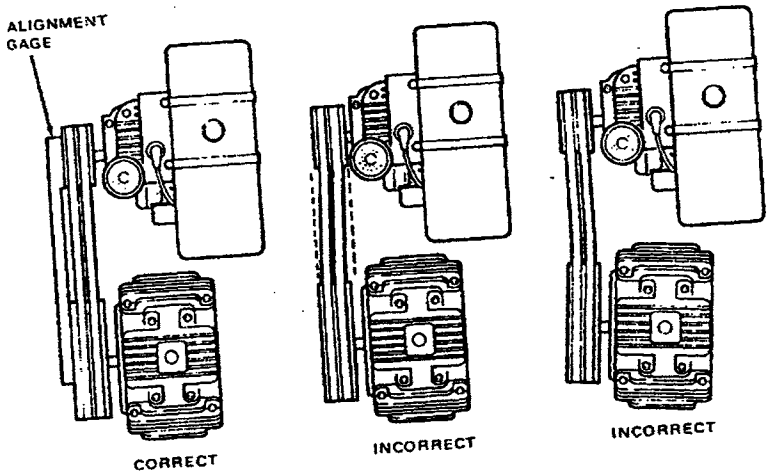
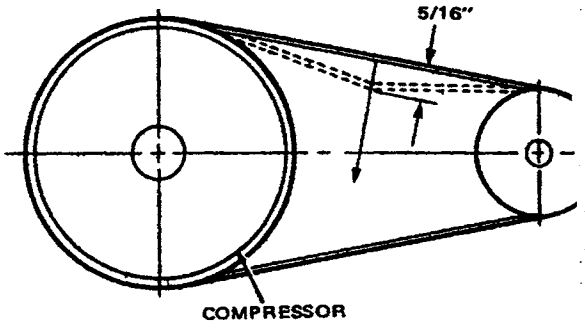
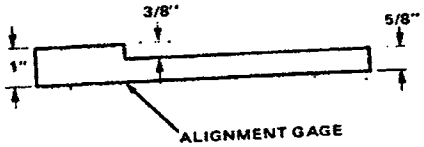
3. BELTS

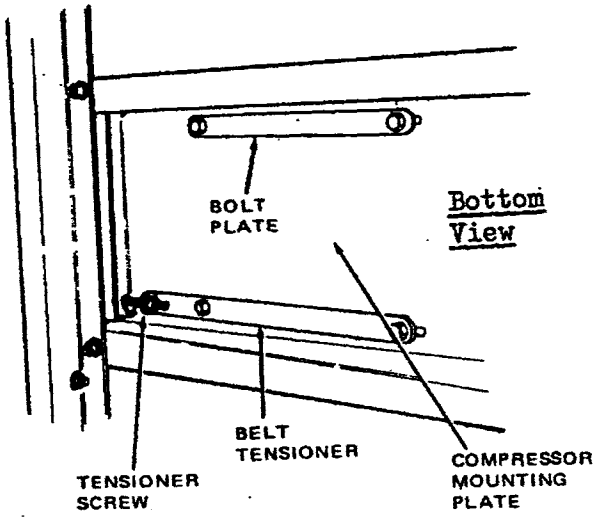
Check drive belts which should be in perfect alignment and neither excessively tight nor loose enough to slip.



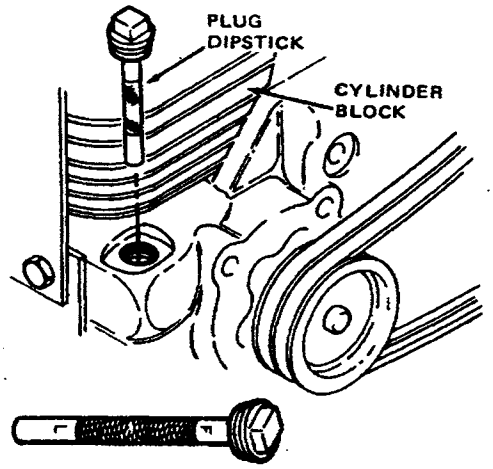




An alignment gage can be made from a piece of scrap metal or wood and be used to line up the pulleys.



4. Check engine oil.



Before checking oil level, clean area around dipstick and oil fill areas to prevent dirt from entering into engine.

Oil should always be checked while engine is level.

With threaded plug-type dipstick, remove and wipe oil off—reinsert, but do not turn plug in. To check oil level, *shoulder* plug on top of hole. After checking, again turn plug all the way into crankcase.

CAUTION: DO NOT operate engine with oil level below "L" mark or over the "F" mark.

Also read Oil Change under Maintenance Instructions.

Oil Type

Use oil meeting the requirements of SAE service class SC, SD, SE, and SF. Select oil viscosity based on the air temperature at the time of operation, as shown.

Air Temperature	Oil Viscosity
Above 32° F (0° C)	SAE-30
Below 32° F (0° C)	SAE 5W-20 or SAE 5W-30

Use straight weight oils as specified. Do not use multi-viscosity oils above 32°F as considerable increases in oil consumption and combustion deposits will result.

5. Clean Air/Fluid nozzles.

See instructions under "Air Pressure", paragraph #1.

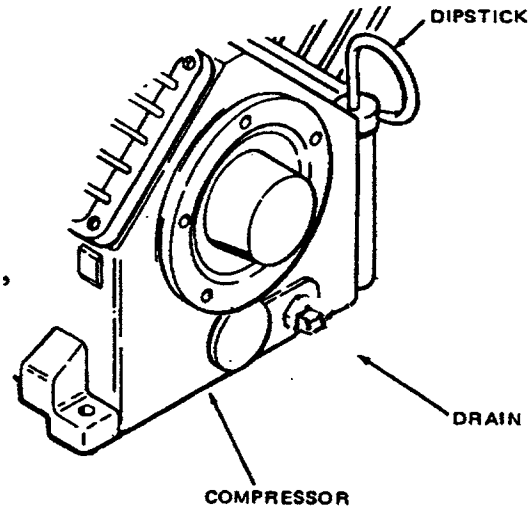
6. FLUSHING

Flush out the chemical system with soap and water or other suitable flushing fluid after each use. Always flush thoroughly prior to down time or storage.

See Operation Section for flushing instructions.

MAINTENANCE

(continued)



7. Change Air Pump Oil:

   Change the air pump crankcase oil. Use Amsoil Synthetic Reciprocating Compressor Oil or Anderol 500 Reciprocating Compressor Lubricant, or SAE 30 Non-Detergent Oil.

8. Change Engine Oil:

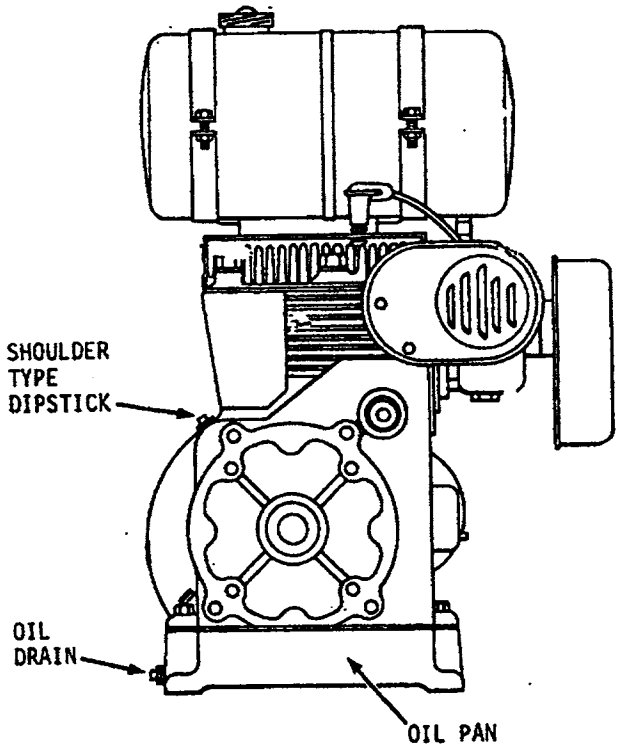
   Change engine Crankcase oil after each 25 hours of operation. Use detergent oil API service classification SC.

On a new engine, change oil after the first 5 hours of operation and then every 25 operating hours thereafter. Change oil more frequently under dirty, dusty conditions.

Drain oil while engine is still warm from operation and it flows freely, carrying away more impurities. (See engine identification illustration for location of drain plug.) After draining oil, reinstall drain plug. Select proper viscosity oil and fill to "F" mark on dipstick as opposed to adding a given quantity of oil. Always check level on dipstick before adding more oil.

Engine must be level when checking or changing oil.

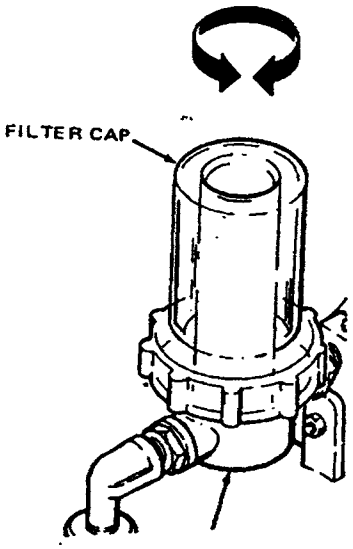
Air Temperature	Oil Viscosity
Above 32° F (0° C)	SAE-30
Below 32° F (0° C)	SAE 5W-20 or SAE 5W-30

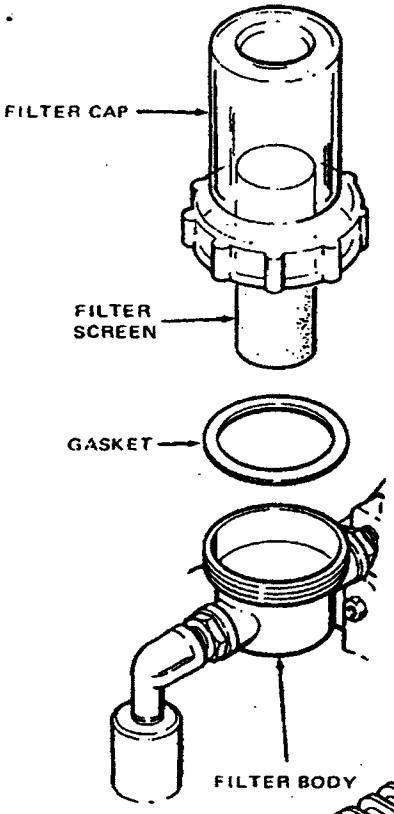


9. Clean Formulation Filter:

There is a fine mesh filter screen located in the large, cylindrical white nylon housing. This screen can be removed for inspection and/or cleaning by manually unscrewing the cap. When reassembling, be sure that the sealing gasket is properly positioned so as to avoid damage caused by pinching. Tighten housing only hand tight during replacement; do not use tools.

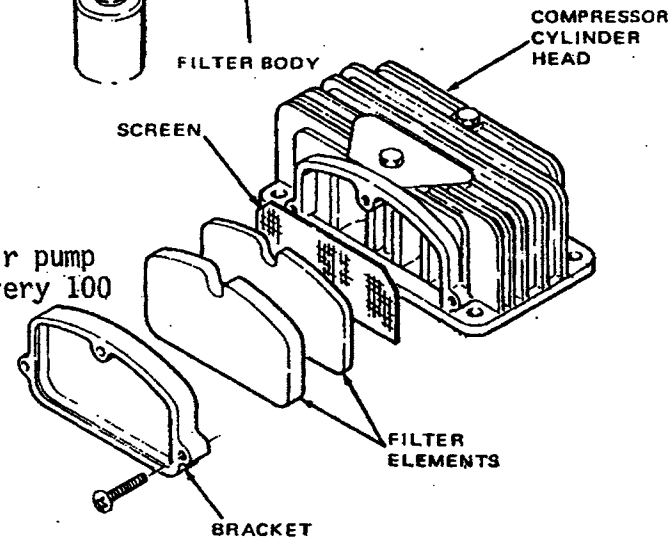
If the screen should become clogged, maximum formulation flow rate will not be attained.



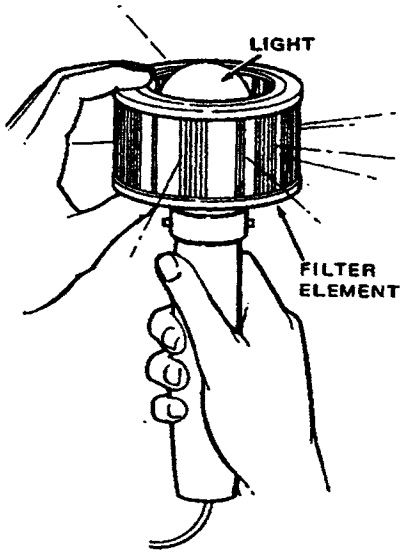


10. Check Air Pump filters:

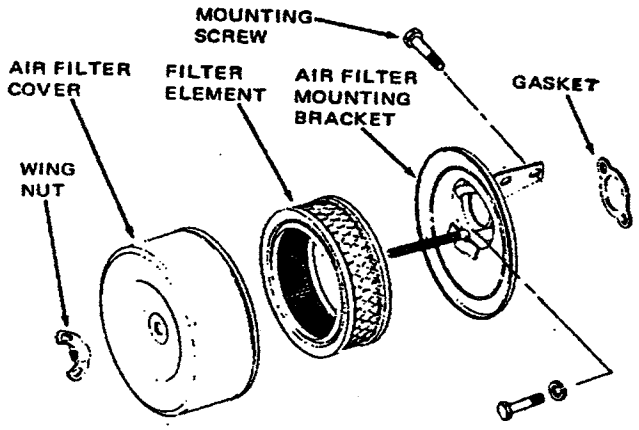
The air intake filters in the air pump should be cleaned or replaced every 100 hours, or sooner if dirty.



11. Clean or replace Engine Air Cleaner Element:



This engine is equipped with a dry-type air cleaner element. Inspect air cleaner element every 50 operating hours and replace when dirty or damaged. Check more frequently under extremely dirty, dusty conditions.

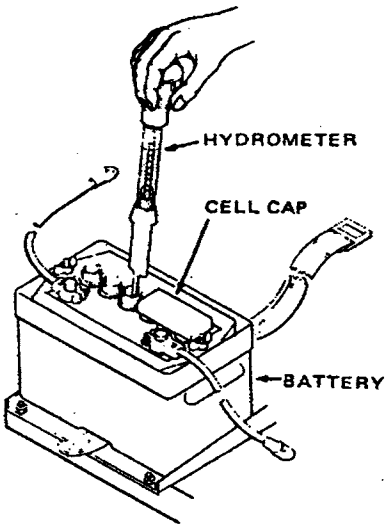


12. Check Battery:

1. Test the battery with a volt-ohmmeter.

   Connect the positive (+) meter lead to the positive (+) battery pole. Connect the negative (-) meter lead to the negative (-) battery pole and set the meter on volts. If the meter reads 11.5 to 12 volts the battery is OK. If the meter reads less than 11.5 volts, check the specific gravity of the electrolyte.

2. Remove the cell caps and check the electrolyte level. Add distilled water if necessary. Check the specific gravity. If the specific gravity is between 1.250 and 1.280, the battery cell being tested is OK. If the specific gravity is between 1.225 and 1.250, the battery cell being tested is still in fair condition. If the specific gravity is below 1.150 in any one cell, replace the battery. If the specific gravity in one cell is 0.050 more or less than the other cells and charging does not bring the charge to a 50% charge, replace the battery.



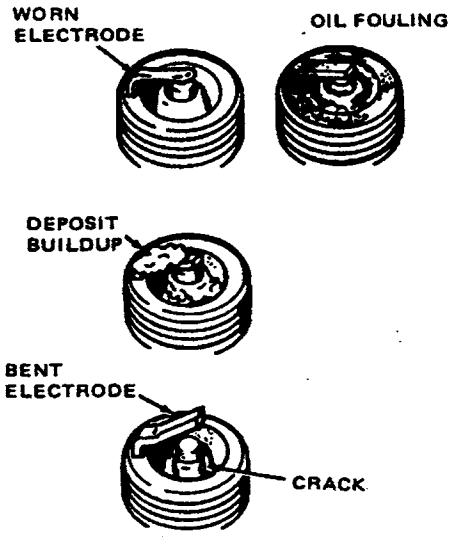
3. Charge the battery:

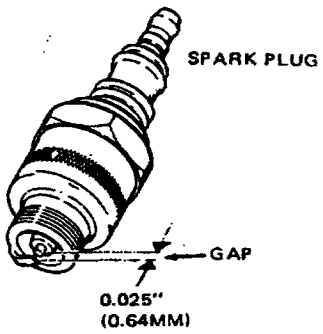
   (a) If the battery does not hold a charge, replace the battery.

   (b) If the battery holds a charge, return the battery to the machine.

13. Check/Gap Spark Plug:

Check spark plug visually. Replace it if the following conditions exist.



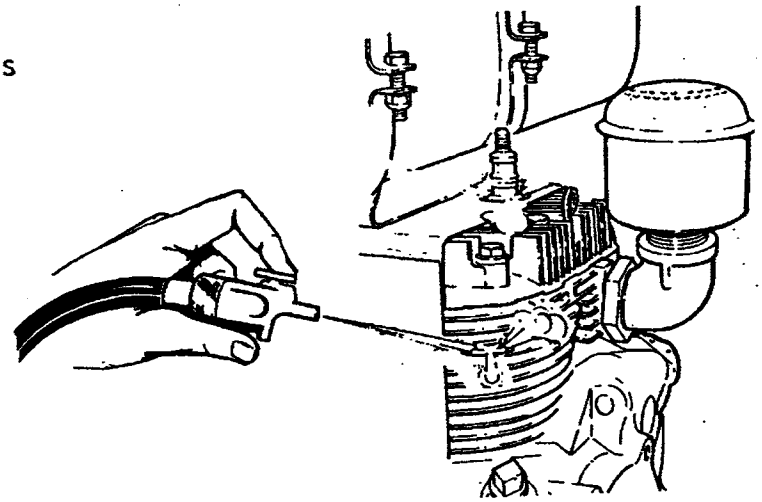


14. Decarbonizing Engine:

Remove engine cylinder head, scrape out carbon deposits, install new cylinder head gasket, install head and tighten bolts in proper sequence. See Torque Specifications page at end of this section.

15. Clean Engine Cooling Fins

Every 50 operating hours (more often if conditions require) remove cooling shrouds and clean cooling fins. Also clean external surfaces of your engine of dust, dirt and oil which can contribute to improper cooling. DO NOT operate engine with cooling shrouds removed—this will cause overheating and engine damage.



16. Check/Set Engine Timing

Refer to Engine Service Manual or Authorized Service Dealer.

17. Check Valve Tapped Clearances:

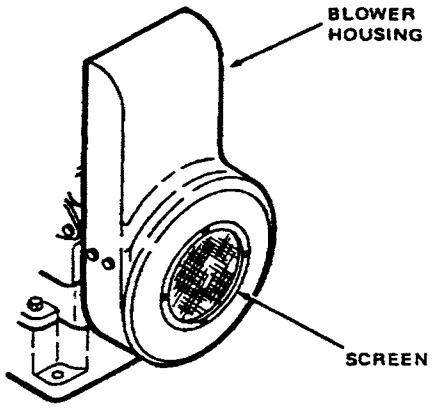
Refer to Engine Service Manual or Authorized Service Dealer.

18. Check All Fittings:

Check all hoses and fittings for cracks, leaks, and/or looseness. Tighten plastic fittings hand tight only.

19. Check Engine Flywheel Screen:

Make sure the air intake screen is clean and unobstructed. If debris builds up on screen during engine operation, STOP engine immediately and clean off. An obstructed screen can cause engine overheating.



20. CHECK/SET RPM:

NOTE

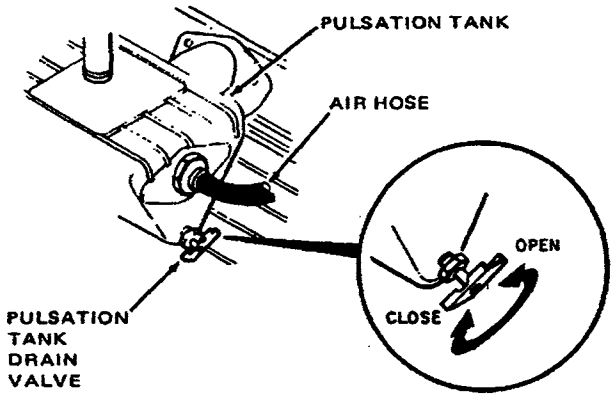
The belts should be connected to the pulleys while checking the engine speed.

A. Check the engine operating speed with a hand-held tachometer. The engine should run at 2700 rpm. If the speed is not 2700 rpm, adjust the throttle.

B. Adjust the engine speed to 2700 rpm. Move throttle lever up to decrease rpm or down to increase engine speed.

21. Drain Pulsation Tank on Air Pump:

Drain Pulsation Tank by opening drain valve with rag placed underneath to catch drainings. This can conveniently be done when starting up at the beginning of the day. Be sure to close drain valve after draining is completed.



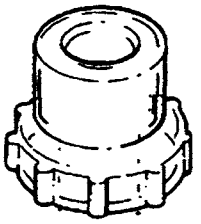
MAINTENANCE

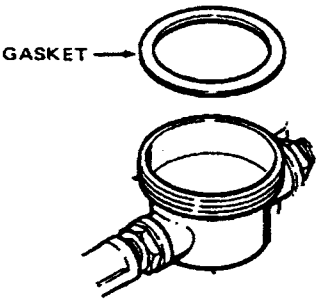
(continued)

22. Check Pulsation Damper:

The piston type metering pump tends to deliver a slightly pulsating flow of insecticide. For best aerosol particle size, a more even (non-pulsating) flow is desirable. A small air chamber type pulsation damper is located in the metering pump pressure outlet line, between the pump and the aerosol discharge nozzle. It is a white nylon assembly with an air dome that can be unscrewed by hand for inspection. It has a gasket which seals the joint between the air dome and the lower section.

The air dome should be checked periodically to make sure that it has not become filled with insecticide. If the dome has no air in it, it will not function as a pulsation damper. Be careful to position the gasket ring carefully, so as to avoid pinching, when replacing the air dome.





23. OVER-PRESSURE ENGINE CUTOFF SWITCH:

The over-pressure cutoff switch system isolated on top of the pulse dampener in the control box. This system monitors the fluid line pressure between the formulation pump and the nozzle. If at any time the fluid line pressure exceeds a factory preset point, the cutoff switch will turn the pump off before damage occurs to the pump or other machine components.

Some problems that may cause the switch to turn the pump off are:

A. Kinked or plugged fluid lines.

B. Defective or plugged solenoid valve.

C. Plugged orifice in fluid nozzle.

D. Nozzle body plugged in fluid carrying portion.

E. Teflon nozzle gasket leaking air into fluid carrying portion of nozzle.

On occasions where the blockage or problem keeps the fluid line pressure right at the cutoff point, pump surging will occur indicating that the cutoff switch is continually turning the pump off and on as the pressure slightly increases and decreases. When-ever this or complete pump cutoff occurs, be sure to find and remedy the cause before trying to continue operation.

IX. TROUBLE SHOOTING

	SYMPTOMS	POSSIBLE CAUSE	CORRECTIVE ACTION
1.	Starter fails to crank engine	a. Battery cable connections loose, dirty or damaged.	a. Clean & tighten cable connections. Replace a damaged cable.
		b. Dead battery.	b. Replace or charge battery.
		c. Starter solenoid defective or loose connections.	c. Replace solenoid & tighten connections.
		d. Defective starter switch.	d. Check starter button on engine and/or starter switch on remote control box.
		e. Starter defective.	e. Replace starter.
		f. Air pump locked up.	f. Inspect Air pump for rotation.
2.	Engine hard to start or fails to start.	a. START-STOP switch on engine in stop position or faulty.	a. Place switch in start position, replace faulty switch.
		b. Machine ON-OFF switch located on remote control box in OFF position or faulty.	b. Place switch in ON position, replace faulty switch.
		c. No fuel or contaminated fuel.	c. Add fuel or clean tank and refuel.
		d. Clogged fuel filter.	d. Clean or replace fuel filter.
		e. Spark plugs faulty.	e. Clean or replace plugs.
		f. Fuel pump or carburetor defective	f. Consult nearest engine service center.
		g. Terminals loose or wiring defective.	g. Tighten loose terminals, replace defective wiring.
		h. Spark plug wire disconnected	h. Connect spark plug wire.
3.	Engine misses or runs erratically	a. Spark plug faulty	a. Clean or replace
		b. Spark plug wire disconnected	b. Connect spark plug wire
		c. Contaminated fuel	c. Replace fuel
		d. Clogged fuel filter	d. Clean or replace
		e. Carburetor mounting gasket leaks	e. Tighten bolts, replace gasket if necessary.
		f. Cylinder head gasket leaks	f. Tighten cylinder head bolts.
4.	Engine knocks or develops noise	a. Crankcase oil low	a. Fill oil to proper level, after oil fill, if noise continues consult nearest engine service center
		b. Muffler clogged	b. Clean or replace
		c. Flywheel loose	c. Consult nearest engine service center
5.	Engine will not run smoothly	a. Carburetor dirty or out of adjustment	a. Clean or adjust carburetor
6.	Engine overheats	a. Crankcase oil low	a. Add oil to proper level
		b. Air shroud clogged	b. Clean or replace air shroud
		c. Exhaust restricted	c. Replace muffler
7.	Engine backfires	a. Gasoline mixture to lean	a. adjust carburetor
		b. Defective spark plugs	b. Clean, adjust and/or replace
		c. inlet valves sticking	c. Free, clean and adjust valve
8.	Engine Compression Low	a. Valve clearance improper	a. Adjust valve
		b. Defective cylinder head	b. Consult nearest engine service center
		c. Defect valves or piston rings	c. Consult nearest engine service center
		d. Cylinder head gasket leaks	d. Tighten head bolts or replace gasket

IX. TROUBLE SHOOTING
(continued)

SYMPTOMS	POSSIBLE CAUSE	CORRECTIVE ACTION
Engine does not deliver full power	a. Carburetor choke valve partly closed	a. Adjust choke.
	b. Air cleaner dirty	b. Service air cleaner
	c. Carburetor defective	c. Clean, adjust or replace
	d. Exhaust restricted	d. Replace muffler
Engine stops suddenly	a. Ignition switch faulty	a. Replace ignition switch
	b. Fuel system has dirt, water or gum	b. Clean fuel tank, link & check fuel filter
	c. Defective choke	c. Inspect choke
	d. Carburetor defective	d. Clean or replace
	e. Air pump locked up	e. Inspect air pump for rotation.
	f. Fuel pump defective	f. Clean or replace
	g. Faulty wiring	g. Tighten loose terminal, replace defective wiring
Air Pump will not operate while engine is running	a. Defective or loose belts	a. Check belts and belt tension
	b. Gears in blower damaged	b. Consult factory
Air Pump makes excessive noise		a. Consult factory
Output light not lit when output switch is in ON position	a. Machine not turned ON	a. Turn on Ignition switch
	b. Defective switch	b. Replace switch. Switch may be temporarily shorted across terminals for test
	c. Lamp defective	c. Replace bulb
Posi-Drive Pump runs but no output	a. Leak in suction line	a. Check lines, tighten
	b. Out of formulation	b. Check that both formulation tank and flush tank have solution in them
	c. Output solenoid not opening	c. Check voltage at connector which goes to solenoid. Should be 12 volts. If not, check for voltage at control panel.
	d. Formulation filter gasket pinched	d. Replace gasket
	e. Flow control lever is set to wrong side	e. Move flow lever to correct position
	f. Filter plugged	f. Clean or replace
	g. Pump defective	g. Visually check pump for rotation and piston movement

X. PREPARATION FOR STORAGE

1. Flush out chemical system thoroughly.

2. If the engine is to be out of service for approximately two months or more, use the following storage procedure:

   A. Drain oil from crankcase while engine is still warm from operation. Refill engine to "F" mark on dip-stick with proper viscosity oil.

   B. Drain fuel tank and carburetor (or run engine until tank is empty).

   C. Remove spark plug and add a tablespoon of engine oil into the spark plug hole. Install plug, but do not connect plug lead. Crank engine slowly 2 to 3 revolutions.

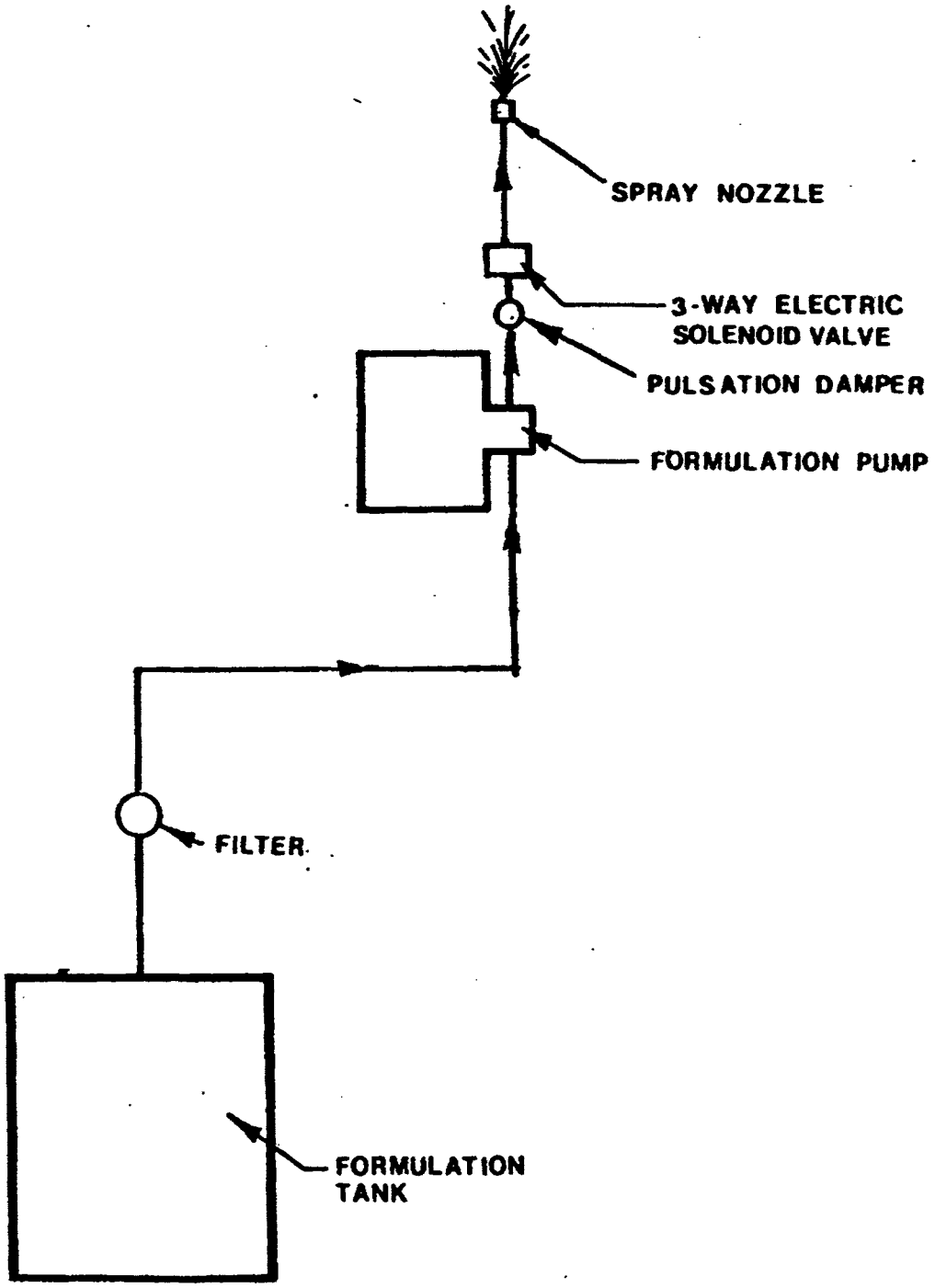
   D. Clean exterior surfaces of engine.

   E. Spread a light film of oil over any exposed metal surfaces of engine to prevent rust.

   F. Store in a clean, dry place.

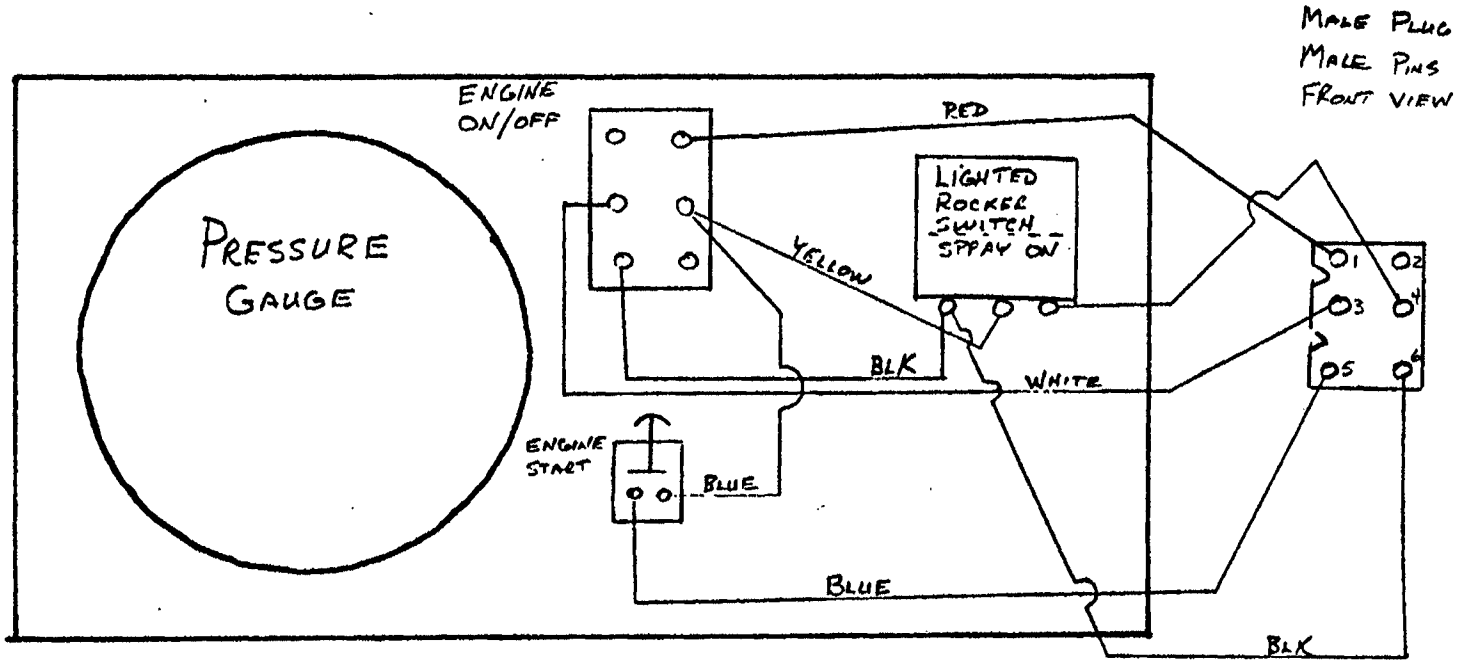
FLUID SYSTEMS DIAGRAM

(Magnum Engine)



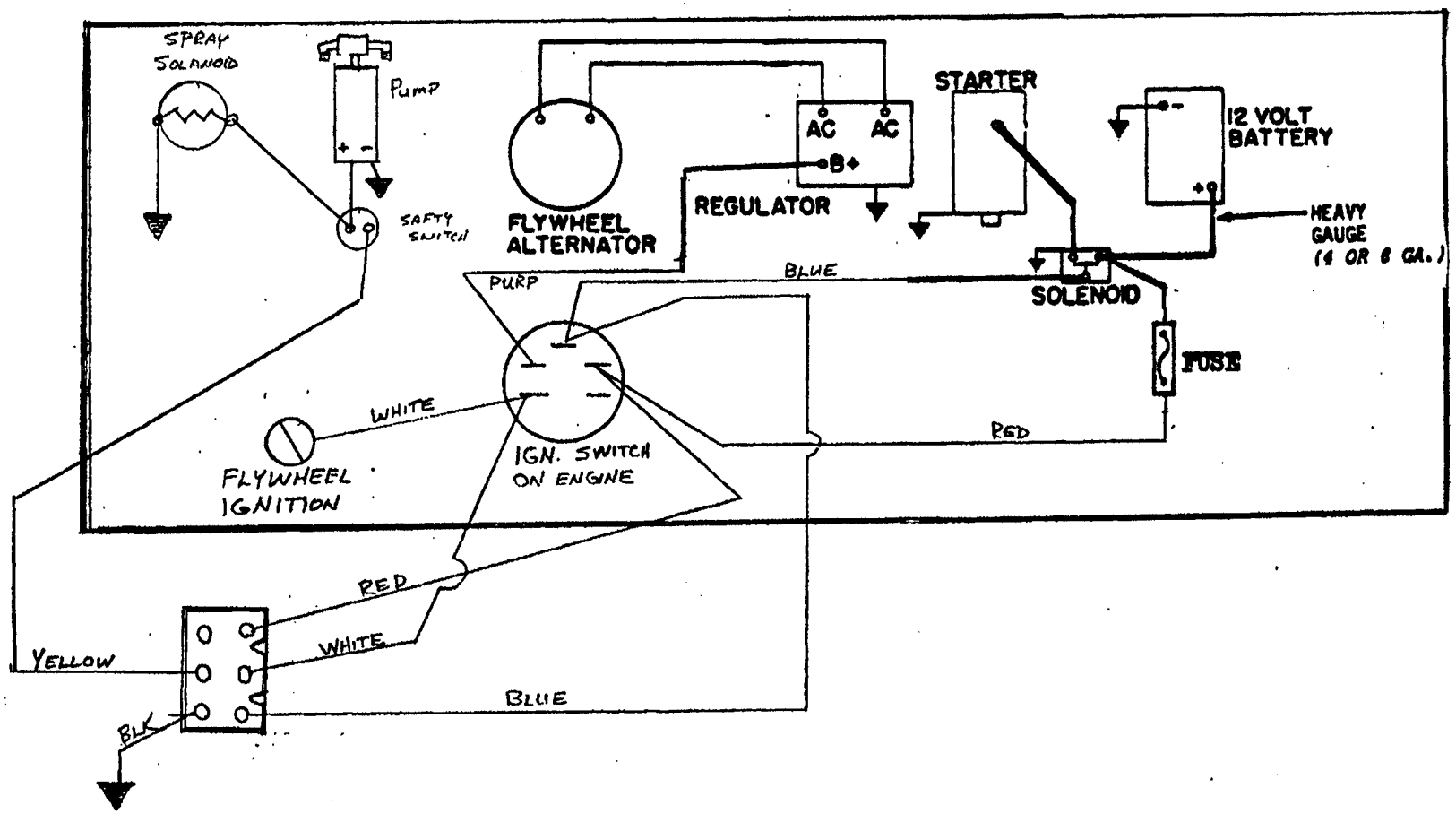
WIRING DIAGRAM - CAB CONTROL

(Magnum Engine)



WIRING DIAGRAM - MACHINE

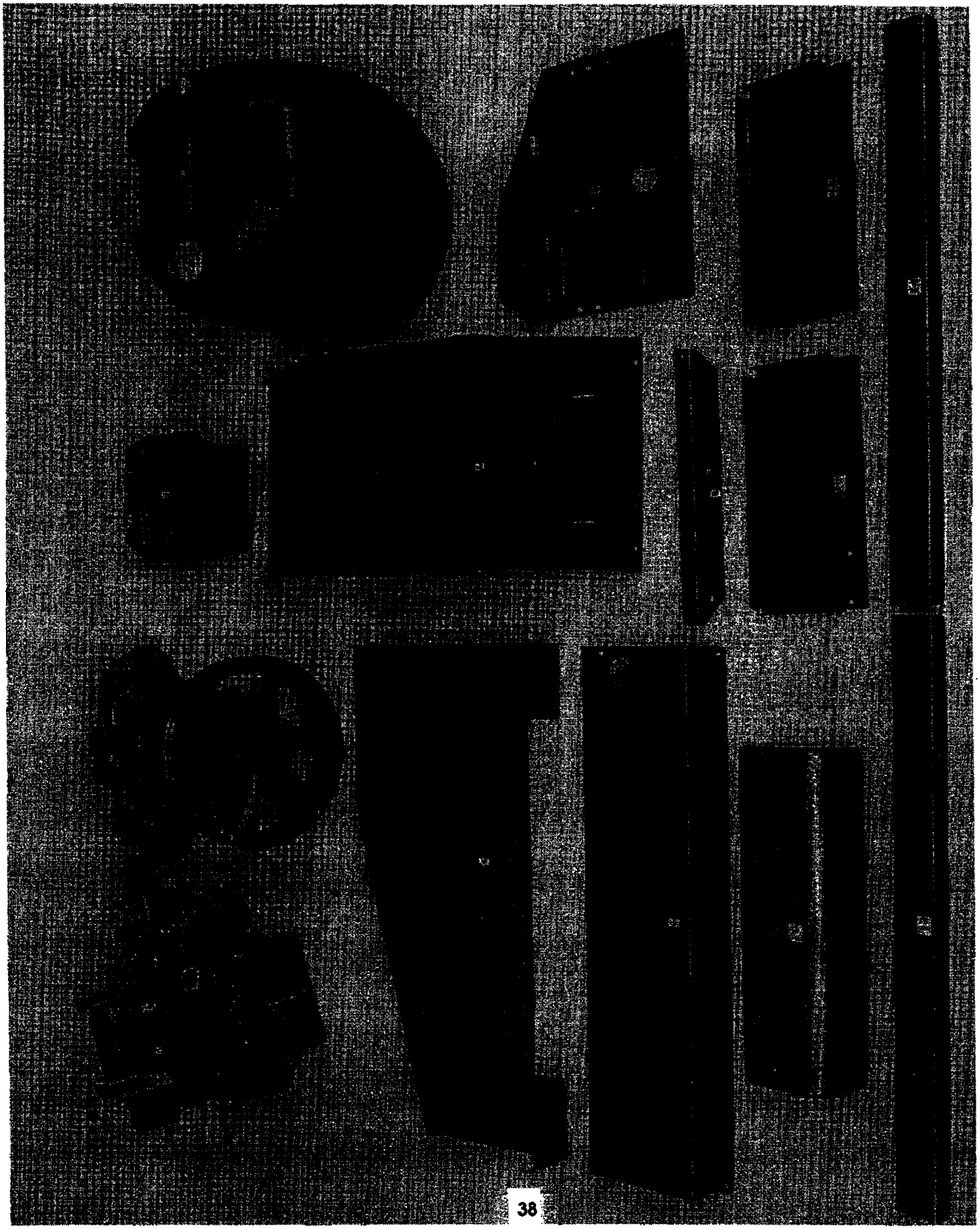
(Magnum Engine)



NOTES

ILLUSTRATED PARTS

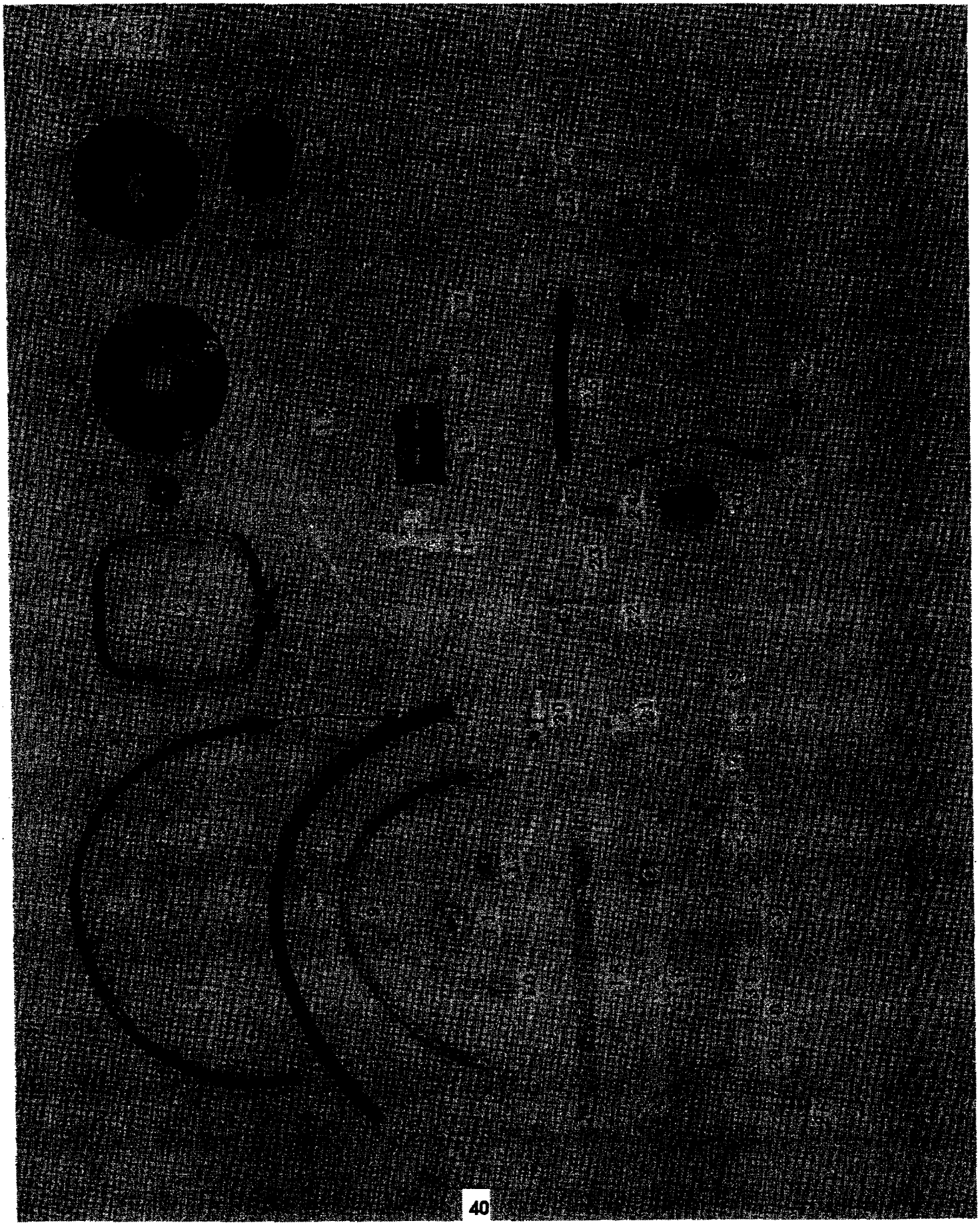
Section I	Basic Machine Parts
Section II	Air compressor parts



XK MODELS

PLATE NUMBER 1

REFERENCE NUMBER	QUANTITY	XKPD BEFORE 1997 WITH METAL GAS TANK ON ENGINE (SERIAL # AND BELOW) PART NUMBER	DESCRIPTION	XKE 1997 AND LATER WITH MOLDED PLASTIC GAS TANK ON ENGINE (SERIAL # AND UP) PART NUMBER	DESCRIPTION
1	1	2161	ENGINE, 8HP, K SERIES	2161.1	ENGINE 8 HP, MAGNUM
2	1	3036	COMPRESSOR	SAME	
3	1	4019	BATTERY BOX	SAME	
4	1	3002.1	BELT GUARD	SAME	
5	1	3112	TRAY, POLYTANK	SAME	
6	1	3089A	POLYTANK ASSEMBLY	SAME	
7	1	3001	MOUNTING BASE	SAME	
8	1	2172	BRACE	NOT REQUIRED	
9	1	2173	PUMP TRAY	NOT REQUIRED	
10	1	2160A	GAS TANK	NOT REQUIRED	
11	1	3113	PARTITION, TRAY	SAME	
12	1	3113.1	PARTITION, TRAY	SAME	
13	1	3104	CROSS RAIL	SAME	
14	1	3106	CROSS RAIL	SAME	



XK MODELS

PLATE NUMBER 2

REFERENCE NUMBER	QUANTITY	XKPD BEFORE 1997 WITH METAL GAS TANK ON ENGINE (SERIAL # AND BELOW) PART NUMBER	DESCRIPTION	XKE 1997 AND LATER WITH MOLDED PLASTIC GAS TANK ON ENGINE (SERIAL # AND UP) PART NUMBER	DESCRIPTION
1	1	2066.1	ELECTRIC HARNESS	NOT REQUIRED	
2	2	K-236938	GAS TANK STRAP	NOT REQUIRED	
3	1	2175	SHAFT EXTENSION	NOT REQUIRED	
4	1	2201	FLYWHEEL SCREEN	NOT REQUIRED	
5	1	3025	PULLEY	SAME	
6	1	3024	DRIVE KEY, 1/4 X 1/4 X 1 1/4	SAME	
7	1	2158	BUSHING	SAME	
8	20"	ST-9.31	1/4" HI TEMP HOSE	SAME	
9	1	2070.2	BATTERY CABLE, POSITIVE	SAME	
10	1	3019	HOSE BARB, 1/4 X 1/4	SAME	
11	1	3017	BUSHING, 3/4 X 1/4	SAME	
12	4	2004.1	HOSE CLAMP	SAME	
13	23"	ST-9.29	1/4" POLYFLOW, 44P		
14	1	2208	TEE FITTING, 1/4	NOT REQUIRED	
15	1	3034	SERIAL NUMBER TAG	SAME	
16	4	N-7702818	POP RIVET	SAME	
17	2"	ST-9.29	1/4" POLYFLOW, 44P	NOT REQUIRED	
18	1	3000	BELT TENSIONER	SAME	
19	1	3004	NUT PLATE	SAME	
20	1	2184.1	COUPLING, FEMALE	SAME	
21	1	2188	ELECTRICAL SOCKET	SAME	
22	1	3114	CONNECTION PANEL	SAME	
23	2	ST-2.29	8 X 3/8 HEX WASHER HEAD	SAME	
24	1	2226	FUEL VALVE	NOT REQUIRED	
25	6"	ST-9.31	1/4" HI TEMP HOSE	NOT REQUIRED	
26	2	2192	SPACER, BELT GUARD	SAME	
27	2	ST-3.09	10-32 X 1/2 PHLPS PAN HEAD	NOT REQUIRED	
28	1	ST-5.51	5/16 X 18 X 2 1/4 HEX HEAD BOLT	SAME	
29	10	ST-5.22	5/16 SAE FLATWASHER	SAME	
30	4	ST-5.08	5/16 - 24 X 1 1/4 HEX HEAD BOLT	SAME	
31	9	ST-5.01	5/16 - 24 HEX NUT	SAME	
32	17	ST-5.26	5/16 LOCKWASHER	SAME	
33	4	ST-5.43	5/16 - 18 X 1 1/4 HEX HEAD BOLT	SAME	
34	9	ST-5.05	5/16 - 24 X 3/4 HEX HEAD BOLT	SAME	
35	4	ST-5.01	5/16 - 24 HEX NUT	SAME	
36	10	ST-4.07	1/4 - 28 X 5/8 HEX HEAD BOLT	SAME	
37	10	ST-4.01	1/4 - 28 HEX NUT	SAME	
38	10	ST-4.50	1/4 SAE FLATWASHER	SAME	
39	10	ST-4.49	1/4 LOCKWASHER	SAME	
40	1	2263	SHRINK TUBE	NOT REQUIRED	
41	1	2261	WIRE ASSEMBLY	SAME	
42	1	2250.1	WIRE ASSEMBLY	SAME	
43	1	2246	OVER PRESSURE SWITCH	SAME	
44	1	2247	MOUNT, SWITCH	NOT REQUIRED	
45	1	ST-3.26	10 - 24 X 1/4 SET SCREW	NOT REQUIRED	
46	1	2171	FEMALE ELBOW, 1/4 X 1/4 X 90 DEG.	NOT REQUIRED	
47	1	ST-4.25	1/4 - 20 X 2 HEX HEAD BOLT	NOT REQUIRED	

XK MODELS

PLATE NUMBER 3

REFERENCE NUMBER	QUANTITY	XKPD BEFORE 1997 WITH METAL GAS TANK ON ENGINE (SERIAL # AND BELOW) PART NUMBER	DESCRIPTION	XKE 1997 AND LATER WITH MOLDED PLASTIC GAS TANK ON ENGINE (SERIAL # AND UP) PART NUMBER	DESCRIPTION
1	2	3027	DRIVE BELT	SAME	
2	1	259.1	1" LOCKNUT	SAME	
3	1	2100.1	1" BLACK STREET ELBOW, 90 DEG.	SAME	
4	1	3016.1	1 X CLOSE BLACK STEEL NIPPLE	SAME	
5	1	K-230410	MUFFLER	SAME	
6	1	2112	TY-RAP, DOUBLE	SAME	
7	1	3015	3/4 X 1/2 90 DEG REDUCING ELBOW	SAME	
8	1	3014	1/2 X 6 BLACK STEEL NIPPLE	SAME	
9	1	139	1/2 X 1 1/2 STEEL NIPPLE	SAME	
10	1	1022	SEPARATOR ASSEMBLY, COMPLETE	SAME	
11	1	3020	1/2 X 90 DEG. BRASS STREET ELBOW	SAME	
12	1	3021	BALLJOINT	SAME	
CONSISTS OF:	(1)	2227	BALLJOINT, MALE HALF	SAME	
	(1)	2228	BALLJOINT, FEMALE HALF	SAME	
13	1	1011	1/2 MALE ELBOW, BRASS	SAME	
14	1	1012	ALUMINUM NOZZLE BODY	SAME	
15	1	1013	TEFLON GASKET	SAME	
16	1	3022	FLUID NOZZLE	SAME	
17	1	3023	AIR CAP	SAME	
18	1	1010	NOZZLE RING	SAME	
19	1	2030	1/8 X CLOSE S.S. NIPPLE	SAME	
20	1	2025.1	3 WAY SOLENOID VALVE W/O COIL (PART OF 2025.1A)	SAME	
21	1	2106	BRACKET	SAME	
22	1	1027	CONNECTOR W/NUT	170	1/8 PIPE PLUG
23	2*	1000.1	VITON GASKET	SAME	
24	1*	1043	STUD	SAME	
25	1*	1002	FILTER ELEMENT	SAME	
26	1*	1001	STUD GASKET	SAME	
27	1*	1048	RETAINING NUT	SAME	
28	1*	1041	CAP, ALUMINUM	SAME	
29	1*	1044	BOWL	SAME	
30	1*	1045	BOTTOM	SAME	
31	1*	1046	BAFFLE	SAME	
32	1*	ST-6.12	3/8 - 24 HEX JAM NUT	SAME	
33	1*	1042	PIPE PLUG	SAME	
34	1*	1047	DRAIN COCK	SAME	
35	1	2025.2A	3 WAY SOL. VALVE WITH COIL	SAME	
36	1	2067.1	SOLENOID COIL ONLY (PART OF 2025.2A)	SAME	

*REFERENCE NUMBERS 23-34 ARE PARTS FOR COMPLETE SEPARATOR ASSEMBLY (PART NUMBER 1022, REFERENCE NUMBER 10)

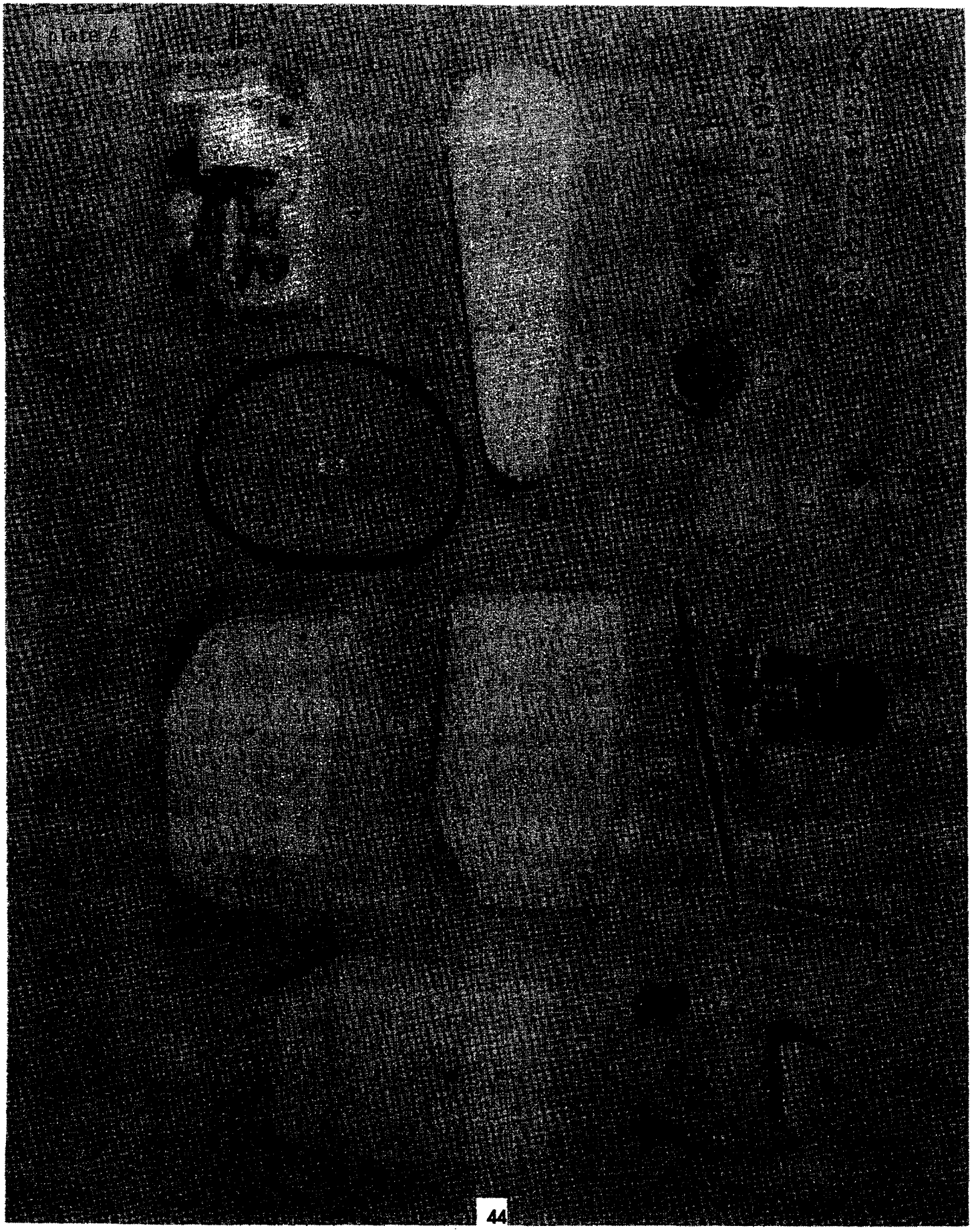


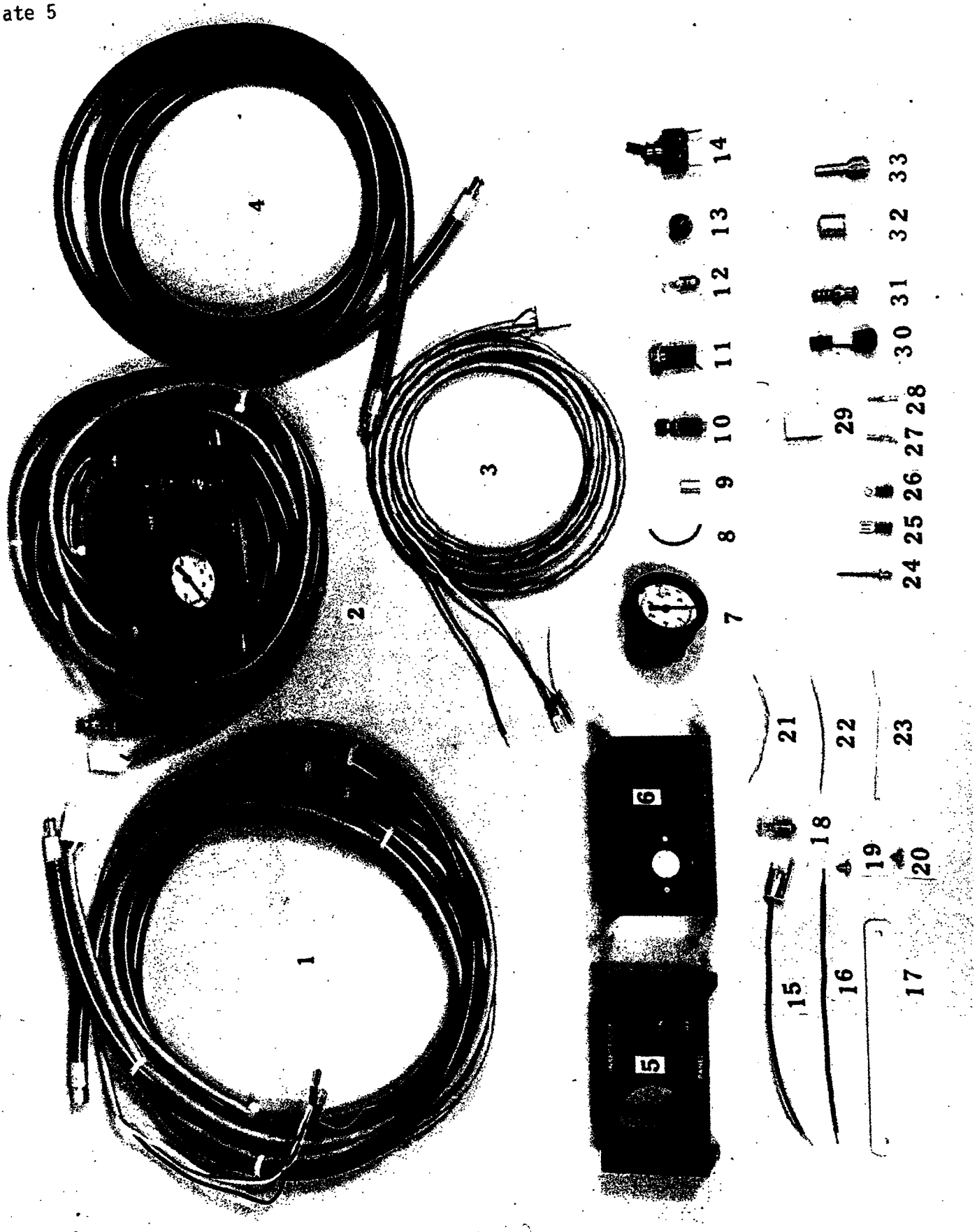
Plate 4

XK MODELS

PLATE NUMBER 4

		XKPD BEFORE 1997 WITH METAL GAS TANK ON ENGINE (SERIAL # AND BELOW)		XKE 1997 AND LATER WITH MOLDED PLASTIC GAS TANK ON ENGINE (SERIAL # AND UP)	
REFERENCE NUMBER	QUANTITY	PART NUMBER	DESCRIPTION	PART NUMBER	DESCRIPTION
1	1	2178.1	LID WITH HOLE (ON MACHINES SER #1200 AND UP)	NOT REQ.	
2	1	2177	PUMP BOX BASE	NOT REQ.	
3	1	2198	TIMING BELT	NOT REQ.	
4	1	2176A	PUMP ASSEMBLY	2176.2A	PUMP ASSEMBLY WITH MOTOR
5	1	4040	STUD (ON MACHINES SER #1200 AND UP)	NOT REQ.	
6	1	4041	STUD RETAINER (ON MACHINES SER #1200 AND UP)	NOT REQ.	
7	1	4039	RECEPTACLE (ON MACHINES SER #1200 AND UP)	NOT REQ.	
8	1	2178	PUMP BOX LID	NOT REQ.	
9	1	2174	BELT GUARD	NOT REQ.	
10	1	4021	BRACKET (ON MACHINES SER #1200 AND UP)	NOT REQ.	
11	1	2179	CLAMP, COVER	NOT REQ.	
12	1	2237	PUMP HEAD ASSEMBLY (PART OF 2176A)	2237.2	PUMP HEAD ASSEMBLY (PART OF 2176.2A)
13	1	2183	LOCKING PLATE (PART OF 2176A)	NOT REQ.	
14	1	2230	GASKET SET (PART OF 2176A)	2230.1	GASKET SET (PART OF 2176.2A)
15	1	2199	PULLEY	NOT REQ.	
16	1	2200.2	PULLEY	NOT REQ.	
17	2	ST-3.18	10-32 X 1 ¼ SOCKET CAP	NOT REQ.	
18	2	ST-3.16	10-32 X 1 SOCKET CAP	NOT REQ.	
19	1	ST-3.13	10-32 X 7/8 PHLPS PAN HEAD	NOT REQ.	
20	2	ST-3.09	10-32 X 1/2 PHLPS PAN HEAD	NOT REQ.	
21	1	2187	WASHER BASE WING NUT	NOT REQ.	
22	1	ST-3.02	10-32 HEX NUT	NOT REQ.	
23	2	ST-3.03	10-32 FLEX LOCKNUT	NOT REQ.	
24	4	ST-3.20	#10 SAE FLATWASHER	NOT REQ.	
25	2	ST-3.22	#10 HI COLLAR LOCKWASHER	NOT REQ.	
26	4	2194	WASHER, PUMPMOUNT	NOT REQ.	
NOT SHOWN	4	NOT REQ.		4187	VIBRATION MOUNT - 4
NOT SHOWN	1	NOT REQ.		4204	ELECTRIC IN LINE RESISTOR

plate 5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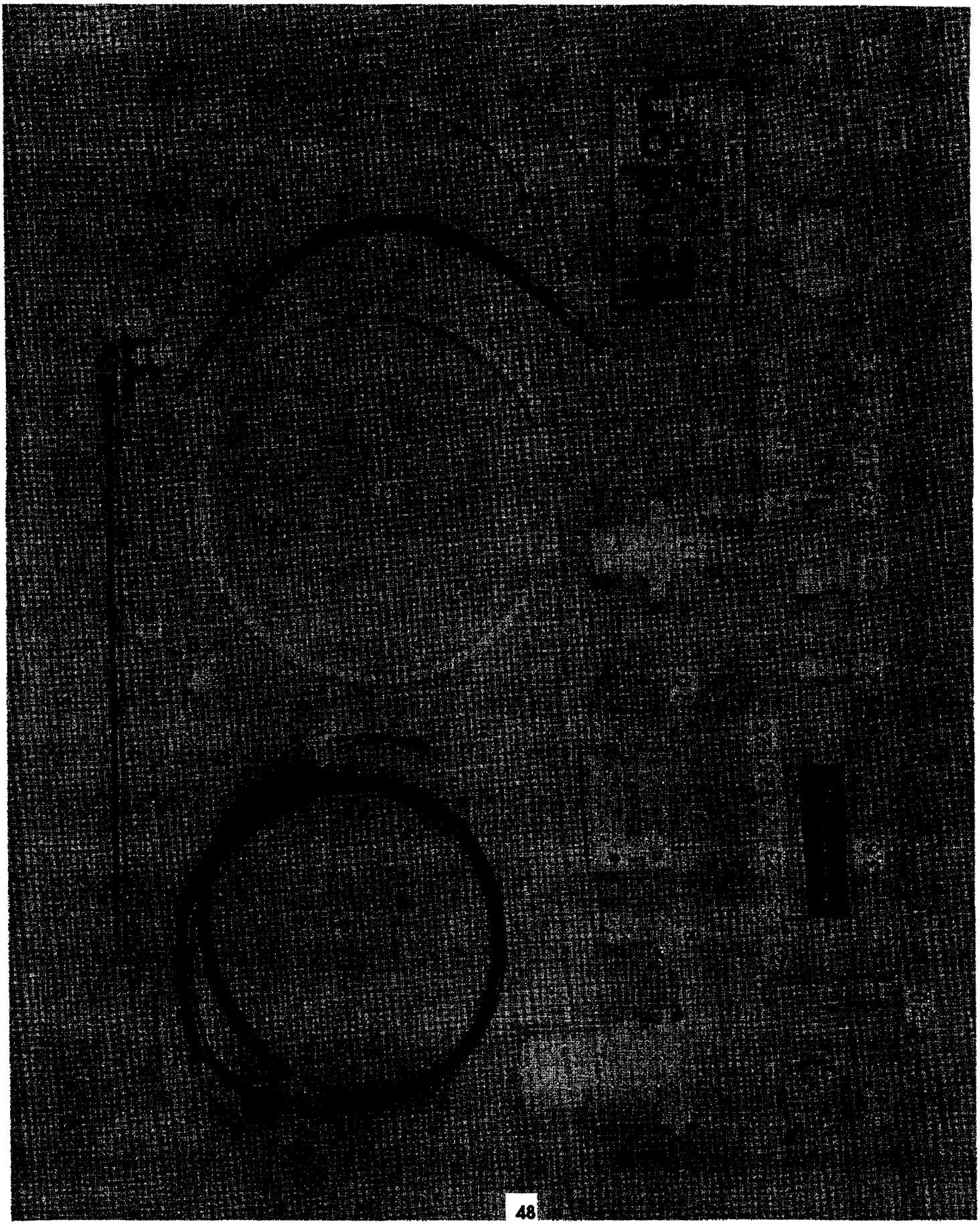
XK MODELS

PLATE NUMBER 5

		XKPD BEFORE 1997 WITH METAL GAS TANK ON ENGINE (SERIAL # AND BELOW)		XKE 1997 AND LATER WITH MOLDED PLASTIC GAS TANK ON ENGINE (SERIAL # AND UP)	
REFERENCE NUMBER	QUANTITY	PART NUMBER	DESCRIPTION	PART NUMBER	DESCRIPTION
1	1	2072.2	WIRE/AIR HARNESS	NOT REQ.	
2	1	2224	CAB CONTROL, COMPLETE	2224.1	CAB CONTROL, COMPLETE
3	* 13'	ST-10.12	16 GA. 4 COND. WIRE	ST-9.39	16 GA. 5 COND. WIRE
4	* 12.5'	ST-9.38	¼ GREY HOSE	SAME	
5	1	2205	COVER, BOX	2205.3	COVER, BOX
6	1	2206	BACK, BOX	2206.2	BACK, BOX
7	1	2075	PRESSURE GAUGE	SAME	
8	1	2116	DECAL	SAME	
9	2	2196	SPACER	NOT REQ.	
10	1	2076.1	SWITCH	1199.1	SWITCH, PUSH BUTTON
11	1	2197.1	LAMP SOCKET	NOT REQ.	
12	1	2107.1	BULB, GREEN	NOT REQ.	
13	1	2197.2	LENS, GREEN	NOT REQ.	
14	1	2076	SWITCH, TOGGLE	4048	SWITCH
15	1	2207	LAMP SOCKET	NOT REQ.	
16	8"	ST-10.03	16 GA. WIRE, BLACK	NOT REQ.	
17	1	2213	BRACKET	SAME	
18	1	2107.2	BULB, PANEL LIGHT	NOT REQ.	
19	2	ST-2.42	8 X 3/8 PHLPS FLAT HEAD	SAME	
20	2	ST-2.41	8-32 X 3/8 PHLPS TRUSS HEAD	SAME	
21	* 3"	ST-10.01	22 GA. WIRE, YELLOW	NOT REQ.	
22	* 3"	ST-10.02	22 GA. WIRE, RED	NOT REQ.	
23	* 8	2111.1	TY-RAP	SAME	
24	1	N-7702755	POP RIVET	NOT REQ.	
25	* 2	N-723104	SLIDE TERMINAL	SAME	ST-10.44 - 3 REQUIRED
26	1	N-721108	TERMINAL	NOT REQ.	
27	* 2	2191	CONNECTOR PIN, FEMALE	NOT REQ.	
28	* 1	2190	CONNECTOR PIN, MALE	SAME	5 REQUIRED
29	* 1	2189	ELECTRICAL SOCKET	SAME	
30	1	2220	STRAIN RELIEF	SAME	
31	* 1	2185	HOSE BARB	SAME	
32	* 2	2004.4	HOSE FERRULE	SAME	
33	* 1	3019.2	HOSE BARB	SAME	
34	1	NOT REQ.		3131	SWITCH, ROCKER/LIGHTED

*REFERENCE NUMBERS IDENTIFIED BY (*) ARE PARTS IN WIRE/AIR HARNESS (PART NUMBER 2072.2, REFERENCE NUMBER 1)



XK MODELS

PLATE NUMBER 6

REFERENCE NUMBER	QUANTITY	XKPD BEFORE 1997 WITH METAL GAS TANK ON ENGINE (SERIAL # AND BELOW) PART NUMBER	DESCRIPTION	XKE 1997 AND LATER WITH MOLDED PLASTIC GAS TANK ON ENGINE (SERIAL # AND UP) PART NUMBER	DESCRIPTION
1	1	3094.1	PICKUP TUBE W/FITTING	NOT REQ.	
2		NOT REQ.		4161	BUSHING, PICKUP TUBE
3		NOT REQ.		ST-9.15	2' S.S. TUBING-3/8" O.D.
4	1	3029.2	WIRE/FLUID LINE HARNESS	NOT REQ.	
5	37"	ST-9.27	3/8" POLYFLOW, 66P	SAME	
6	1	2071.2	BATTERY CABLE, NEGATIVE	SAME	
7	20"	ST-9.27	3/8" POLYFLOW, 66P	SAME	
8	20"	ST-9.29	¼" POLYFLOW, 44P	SAME	
9	1	2007.1	STRAINER, COMPLETE	SAME	
10	2	2382	3/8 X 3/8 MALE ELBOW	2389	3/8 X 3/8 MALE CONNECTOR
11	1	3096	BRACKET	SAME	
12	2	2136	U-BOLT	SAME	
13	1	2182	PULSATION DAMPER	SAME	
13A		NOT REQ.		2182A	PULS. DAMP. W/OVER PRESS. SWI
14	1	3088	MOUNT PLATE	SAME	
15	2	3092	BRACKET	SAME	
16	2	2170	¼ X ¼ FEMALE CONNECTOR	SAME	¼ X ¼ FEMALE CONN. 1 REQ.
NOT SHOWN	1	2171	NOT REQUIRED	SAME	¼ X ¼ FEMALE 90 DEG. ELBOW
17	2	ST-2.28	8-32 X 1/2 PHLPS FLATHEAD	SAME	
18	2	ST-2.39	#8 LOCKWASHER	NOT REQ.	
19	2	ST-2.36	8-32 HEX NUT	NOT REQ.	
20	1	2114	DECAL, TANK	SAME	
21	1	2035	GASKET (PART OF 2007.1)	SAME	
22	1	2036	FILTER SCREEN (PART OF 2007.1)	SAME	
23	2	ST-10.25	¼-20 X 5/8 PHLPS FLATHEAD	SAME	
24	2	ST-4.49	¼" LOCKWASHER	SAME	
25	2	ST-4.51	¼-20 HEX NUT	SAME	
26	4	ST-3.20	#10 SAE FLATWASHER	SAME	
27	4	ST-3.21	#10 LOCKWASHER	SAME	
28	4	ST-3.23	10-24 HEX NUT	SAME	
29	1	1027	1/8 X 1/4 CONNECTOR W/NUT	2389.1	MALE CONN. WITH G-NUT
30	1	2084	¼ X 3/8 X 90 DEG. MALE ELBOW W/N	4156.1	3/8 UNION ELBOW
31	4	ST-5.05	5/16-24 X 3/4 HEX HEAD BOLT	SAME	
32	4	ST-5.01	5/16-24 HEX NUT	SAME	
33	4	ST-5.22	5/16 SAE FLATWASHER	SAME	
34	4	ST-5.26	5/16 LOCKWASHER	SAME	
35	1	3098.1	CAP (PART OF 3098)	SAME	
36	1	3091	HANDLE (PART OF 3098)	SAME	
37	2	2196	SPACER (PART OF 3098)	SAME	
38	2	ST-2.49	8-32 X 1 SLOTTED PAN HEAD, S.S. (PART OF 3098)	SAME	
39	2	ST-2.37	8-32 HEX NUT, S.S. (PART OF 3098)	SAME	
40	2	2111.1	TY-RAP	NOT REQ.	

NOTES

SECTION II

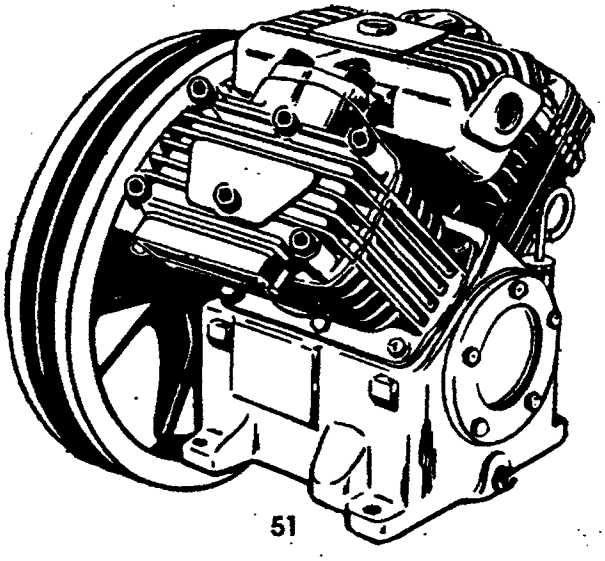
ILLUSTRATED PARTS LIST

V-230

AIR PUMP

IMPORTANT

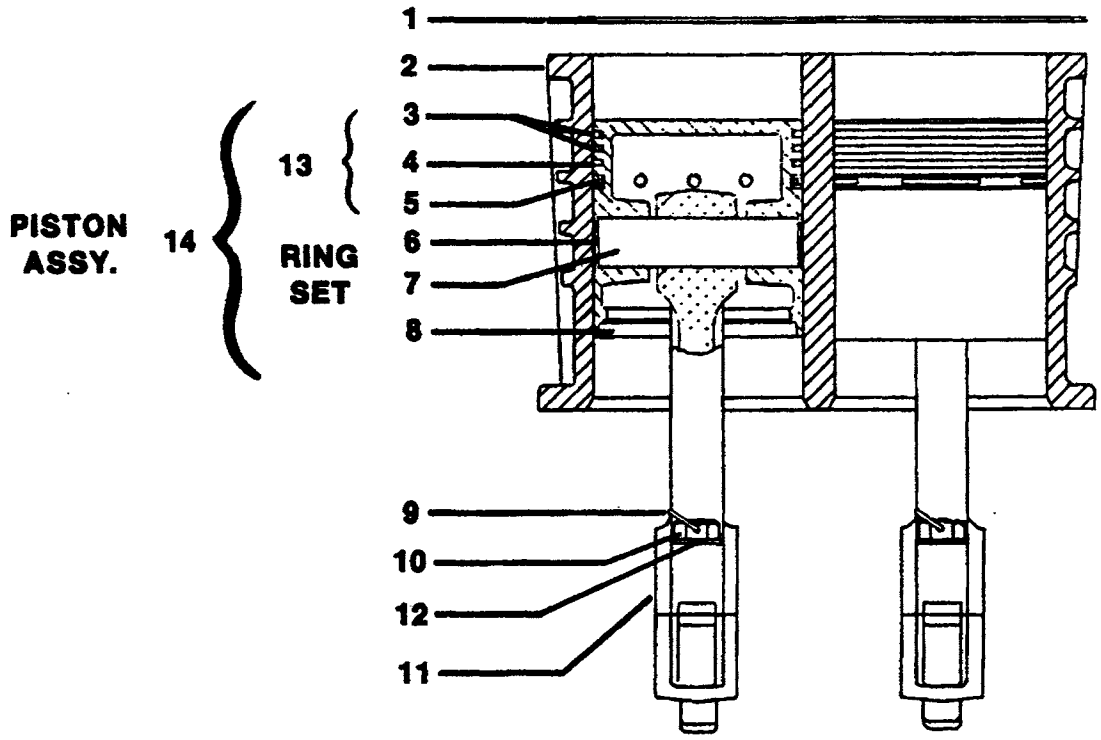
For use with air pumps having REED VALVE head design and ALLEN (socket) HEAD type head bolts. Used on machines S/N 596 and higher. For earlier model machines, contact your distributor.



AIR PUMP
CYLINDER GROUP

IMPORTANT

For use with air pumps having REED VALVE head design and ALLEN (socket) HEAD type head bolts.



REFERENCE NUMBER	PART NUMBER	DESCRIPTION	QUANTITY REQUIRED PER UNIT
1	S 1316	Head Gasket	2
2	S 1394-A	Cylinder	2
3	S 1533	Compression Ring (Beveled Inside Edge Up)	8
4	S 1534	Compression Ring (Square Groove Down)	4
5	S 1321	Oil Ring	4
6	S 1210	Piston Pin Plug	8
7	S 1319	Piston Pin	4
8	S 1460	Piston	4
9	S 1537	Connecting Rod Wire	4
10	S 1524	Connecting Rod Bolt	8
11	S 1399	Connecting Rod	4
12	S 1227	Connecting Rod Washer	8
		ASSEMBLIES	
13	S 1549	Complete Set of Rings	1
14	S 1548	Piston With Pin & Rings	4
*	S 2206	Gasket Set (For Complete Compressor)	1

*Not illustrated

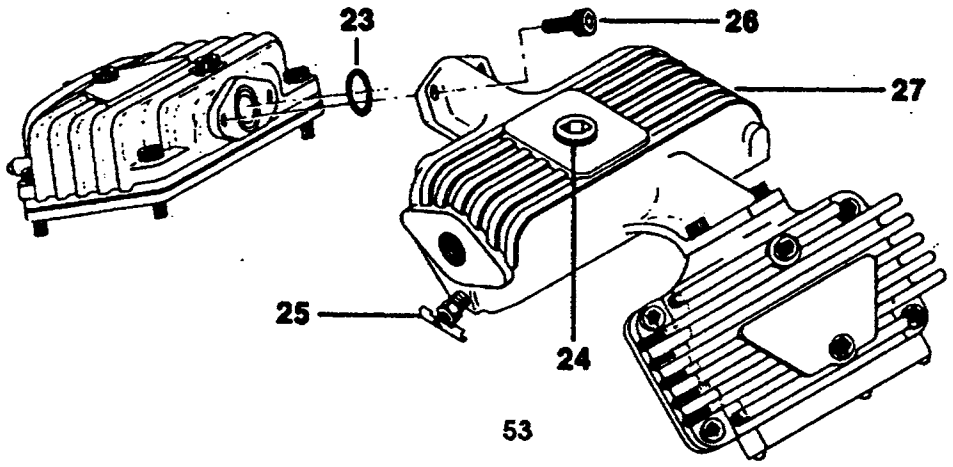
AIR PUMP
PARTS LIST
HEAD GROUP
REED VALVE DESIGN

IMPORTANT

For use with air pumps having REED VALVE head design and ALLEN (socket) HEAD type head bolts.

INSTRUCTIONS FOR INSTALLATION:

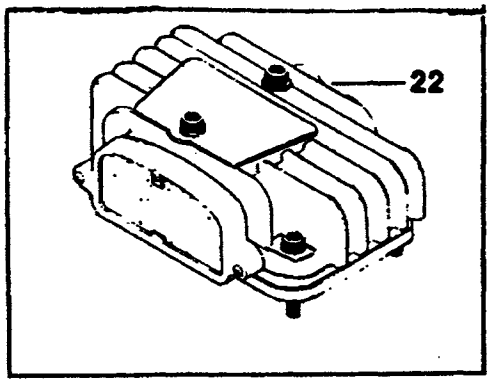
1. MAKE SURE PARTS ARE ASSEMBLED AS SHOWN IN EXPLODED VIEWS (ESPECIALLY THE VALVE PLATES).
2. CONCERNING VALVE PLATES THE "TOP" PLATE #2149 IS THE INTAKE. THE BOTTOM VALVE PLATE #2037 IS THE DISCHARGE. THE TOP VALVE PLATE IS STAMPED "THIS SIDE UP."
3. IF YOU ATTACH THE REED VALVES BE SURE TO USE THE CORRECT REEDS. THE INTAKE REED IS .010" THICK AND THE DISCHARGE REED IS .015" THICK.
4. MAKE SURE GASKETS ARE ALL IN GOOD CONDITION AND PROPERLY ASSEMBLED.
5. ASSEMBLE BOTH HEADS ON CYLINDERS WITH HEAD BOLTS (#2273 & #2274) STARTED ONLY, NOT TIGHT. SET PULSATION TANK (#2099) IN PLACE BETWEEN HEADS, MAKING SURE THE #2098 O-RING IS IN PLACE IN EACH HEAD. SCREW THE (4) TANK MOUNTING BOLTS (#2136) DOWN BUT NOT TIGHT. SNUG (6) HEAD BOLTS IN EACH HEAD TO LIGHT TORQUE. TIGHTEN (4) TANK BOLTS TO 400INCH POUNDS TORQUE. TIGHTEN (6) HEAD BOLTS IN EACH HEAD TO400 INCH POUNDS TORQUE, DOING THE (2) LONG CENTER BOLTS (#2274) FIRST AND THE (4) SHORT BOLTS (#2273) LAST. AFTER 5 HOURS USE, RETORQUE ALL HEAD BOLTS TO 400INCH POUNDS.

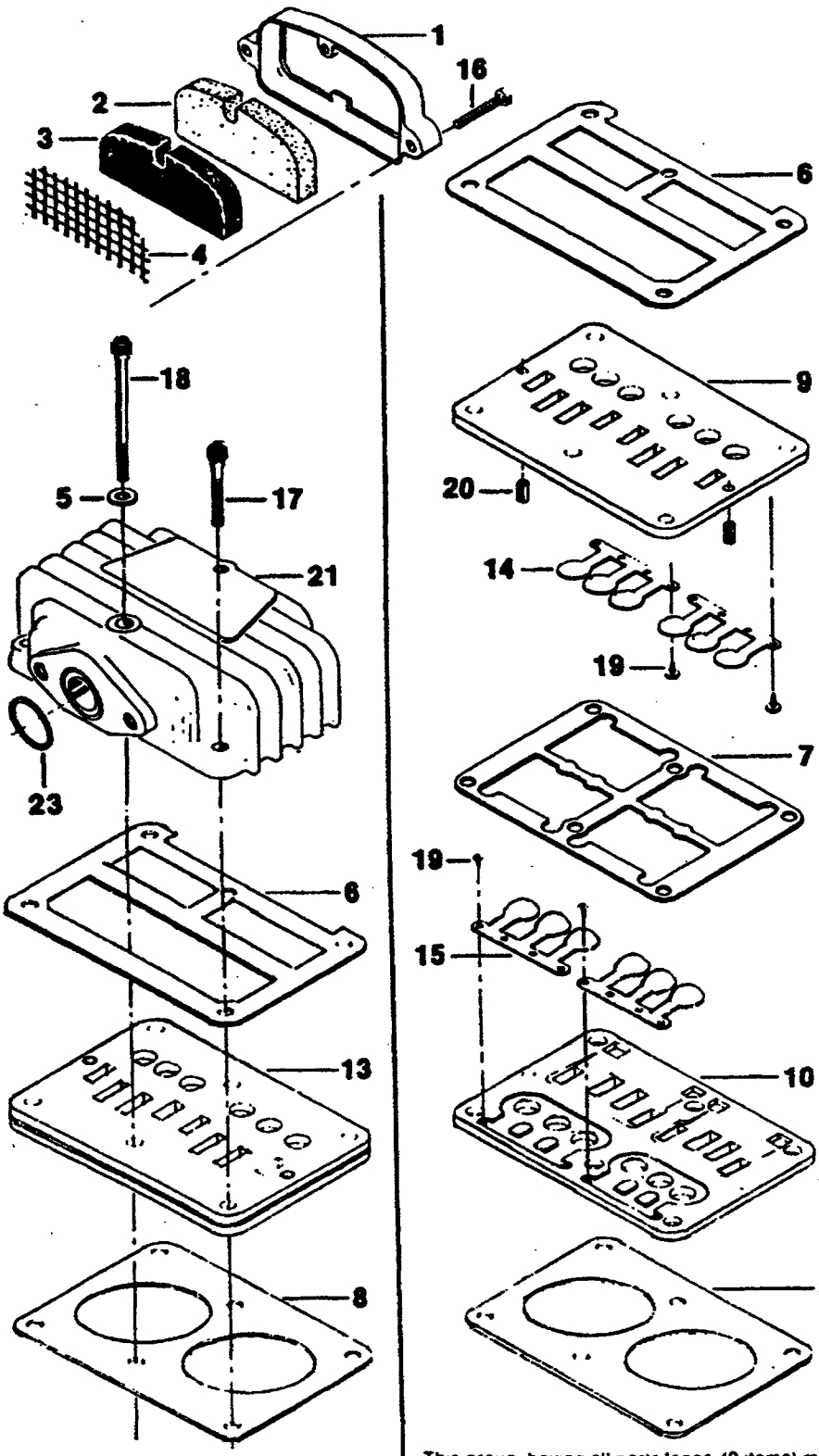


IMPORTANT

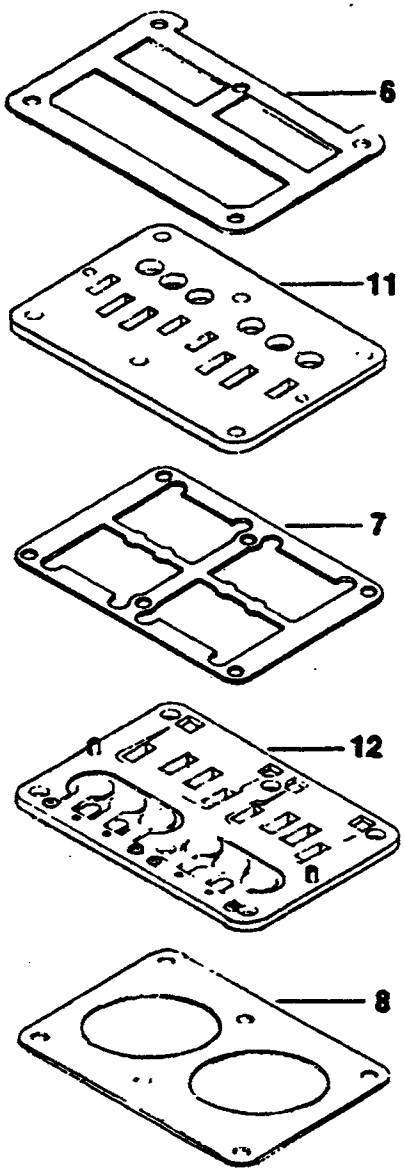
HEAD GROUP

For use with air pumps having REED VALVE head design and ALLEN (socket) HEAD type head bolts.





This group, having all parts loose, (9 items) make up a complete set of valve plates (same as #13 Assembly)



This group (5 items) is the same as center group—except the reeds are attached to valve plates.

HEAD GROUP

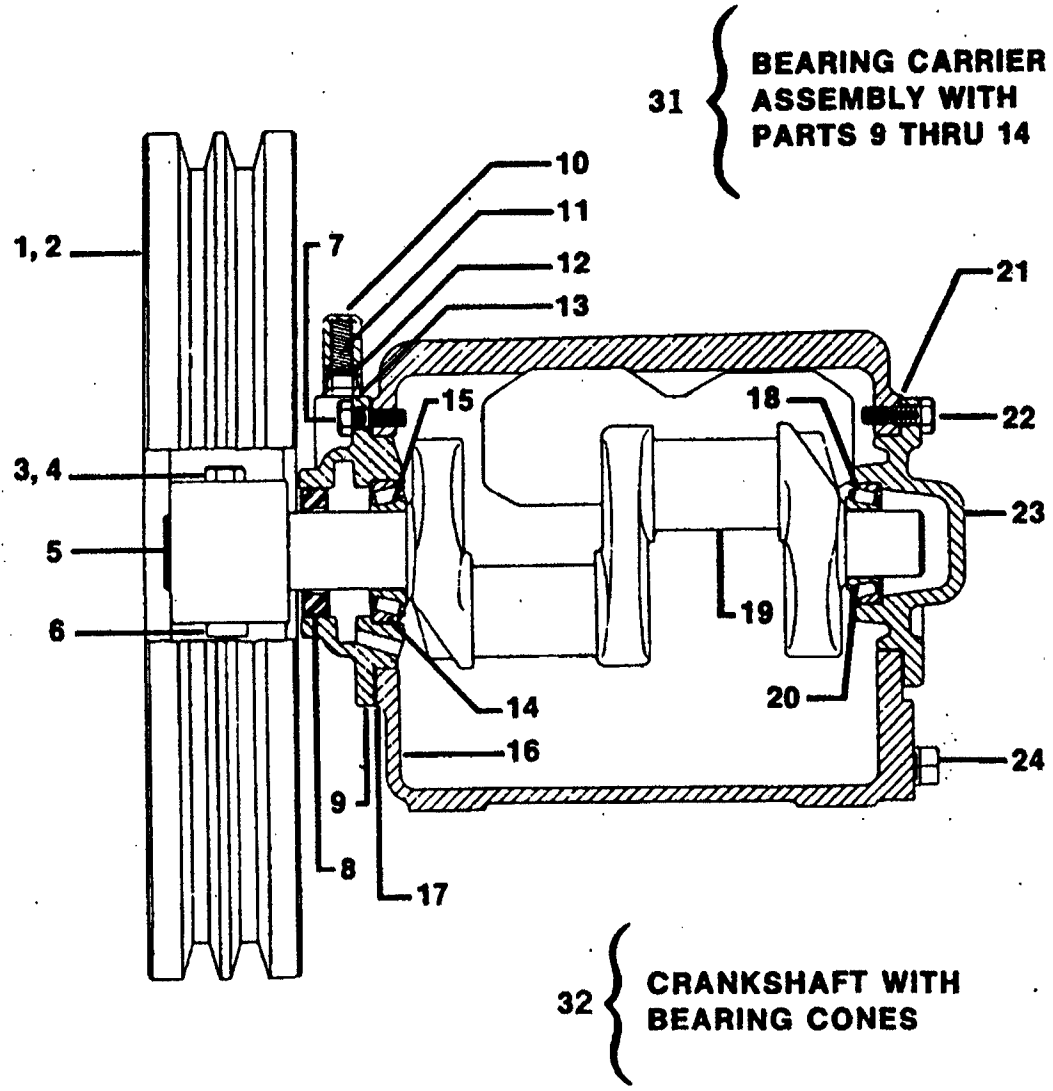
IMPORTANT

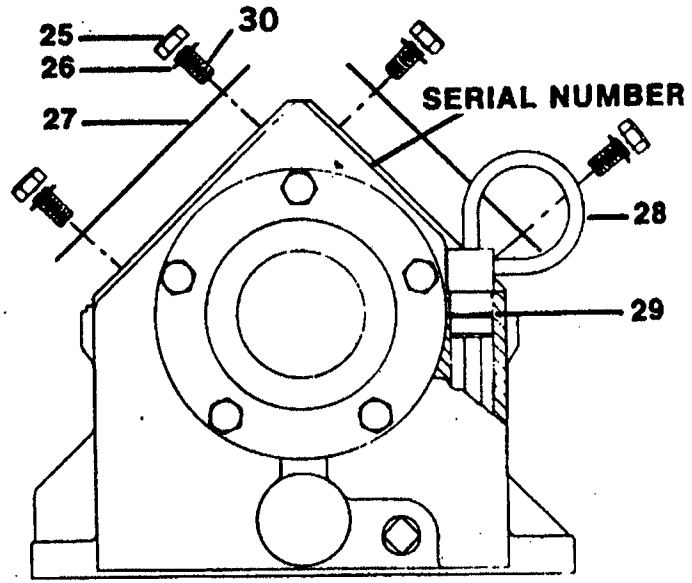
For use with air pumps having REED VALVE head design and ALLEN (socket) HEAD type head bolts.

REFERENCE NUMBER	PART NUMBER	DESCRIPTION	QUANTITY REQUIRED PER UNIT
1	S 2104	Filter retainer	2
2	S 2128	Filter outer element	2
3	S 2129	Filter inner element	2
4	S 2130	Filter screen	2
5	S 2272	Gasket washer for long head bolt	2
6	S 2138	Gasket top (between #2147 & #2149)	2
7	S 2058	Gasket middle (between valve plates)	2
8	S 1316	Gasket bottom (between valve plate & cylinder) For 2¾" bore cylinders. Model V-230	2
9	S 2149	Top valve plate only (intake)	2
10	S 2037	Bottom valve plate only (discharge)	2
11	S 2157	Top valve plate #2149 with reed valves (assembled)	2
12	S 2158	Bottom valve plate #2037 with reed valves (assembled)	2
13	S 2143	Set valve plates, intake and discharge, assembled (includes top and bottom gaskets)	2
14	S 2035	Reed valve only (intake)	4
15	S 2036	Reed valve only (discharge)	4
16	S 2131	Screws for filter	6
17	S 2273	Head bolts (short)	8
18	S 2274	Head bolts (long)	4
19	S 2057	Screws for reed valves	16
20	S 2023	Spirol pin for valve plate	4
21	S 2147	Head only (not drilled for unloader)	2
22	S 2168	Complete head assembly, with all gaskets valves, bolts, and complete filter (plain type without unloader) as shown	2
23	S 2098	O-ring	2
24	S 1923	Pipe plug	2
25	S 1459	Draincock	1
26	S 2136	Pulsation tank mounting bolts	4
27	S 2099	Pulsation tank	1

AIR PUMP
CRANKCASE GROUP

For all models with REED VALVE head design





November 29, 1979

REFERENCE NUMBER	PART NUMBER	DESCRIPTION	QUANTITY REQUIRED PER UNIT
1	S 1390	14" O.D. x 1-3/16" Bore 2 "B" Groove Pulley	1
2			1
3	S 1383	Pulley Hub Clamp Bolt For 1390 Pulley	2
4			1
5	S 1382	Pulley Key	1
6	S 1379	Pulley Clamp Nut (For #1390 Pulley)	2
7	S 1633	5/16" x 1" Hex Head Cap Screw	5
8	S 1381	Crankshaft Oil Seal	1
9	S 1397	Front Bearing Carrier	1
10	S 1358	Breather Cap	2
11	S 1291	Breather Spring	2
12	S 1153	Breather Valve	2
13	S 1357	Breather Seat	2
14	LM67010	Bearing Cup	1
15	LM67048	Bearing Cone	1
16	S 1398	Crankcase	1
17	S 1403	Bearing Carrier Gasket	3
18	L44610	Bearing Cup	1
19	S 1400	Crankshaft	1
20	L44649	Bearing Cone	1
21	S 1402	Bearing Carrier Gasket	3
22	S 1633	5/16" x 1" Hex Head Cap Screw	5
23	S 1396	Rear Bearing Carrier	1
24	S 1111	Oil Drain Plug	1
25	S 1978	5/16" - 24 hex nut	12
26	S 1353	Lock Washer	12
27	S 1404	Cylinder Gasket	4
28	S 1521	Dip Stick (Oil Level)	1
29	S 1265	Dip Stick "O" Ring	1
30	S 1970	5/16" Stud	1
		ASSEMBLIES	
31	S 1431	Front Bearing Carrier Assembly (Includes Breathers & Bearing Cup)	1
32	S 1430	Crankshaft Assembly (Includes Bearing Cones)	1
*	S 2206	Complete Set of Gaskets Model V-230	1
			1
			1

*Not Illustrated

NOTES